OCTOBER 1959

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE

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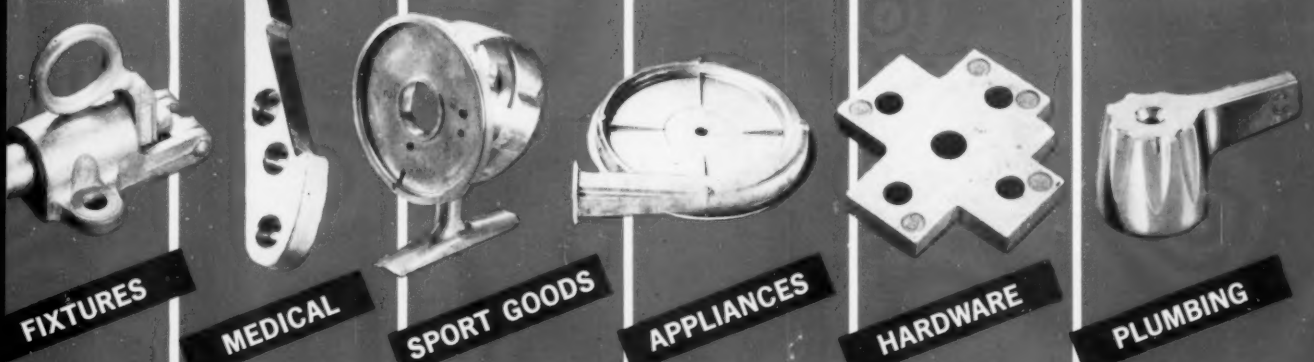

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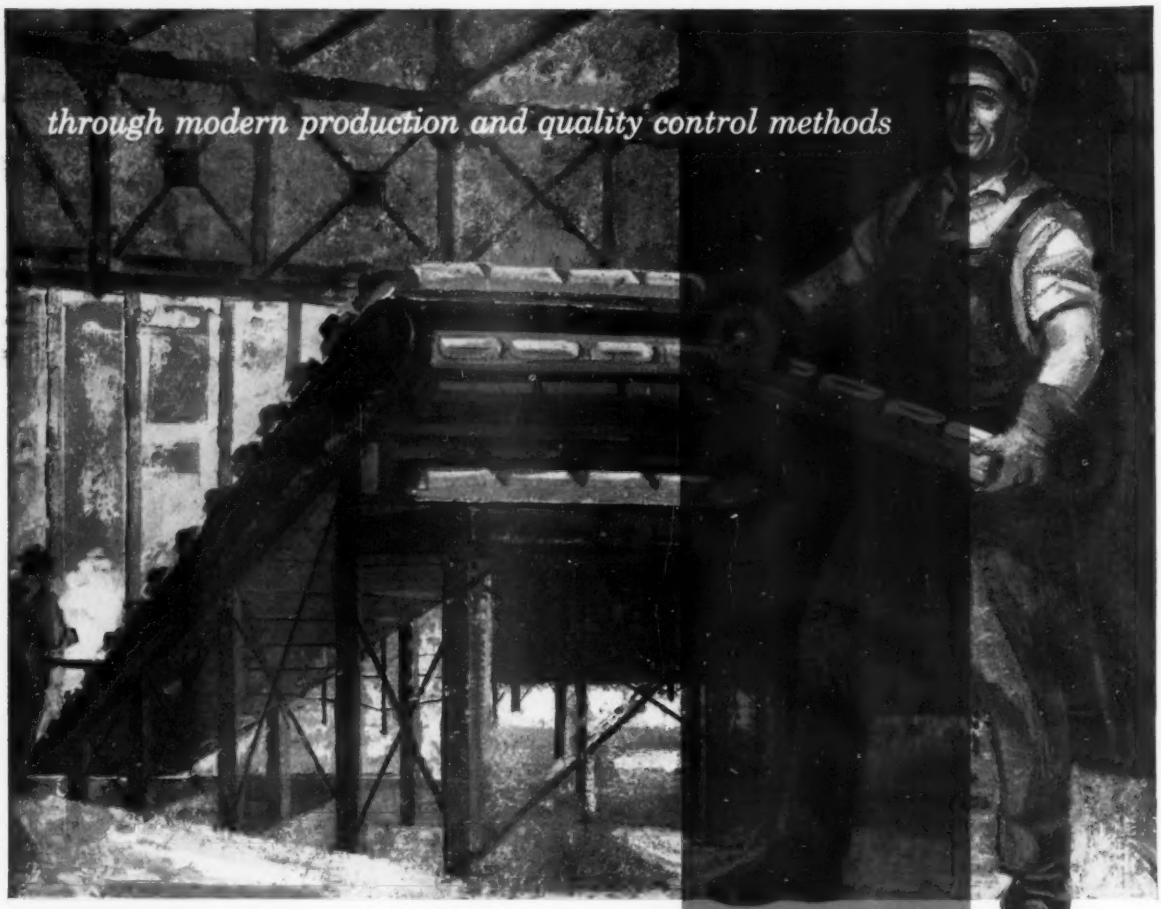

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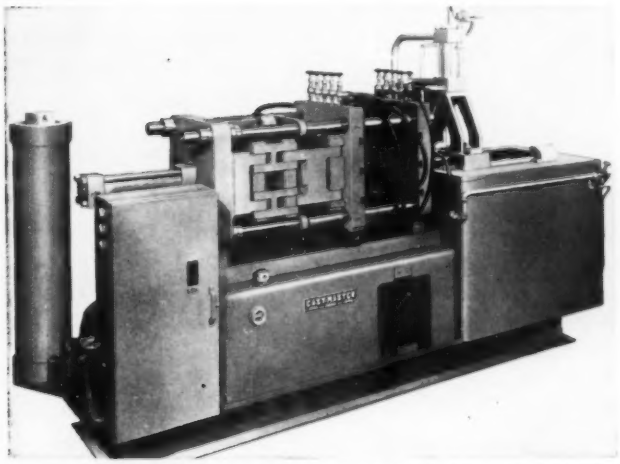
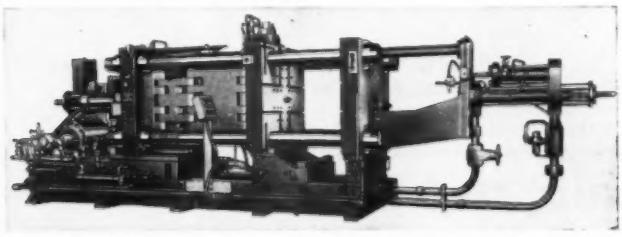


MODEL 7Z 100-ton hot chamber automatic for high speed production of small castings.



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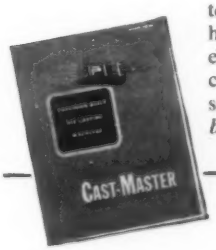

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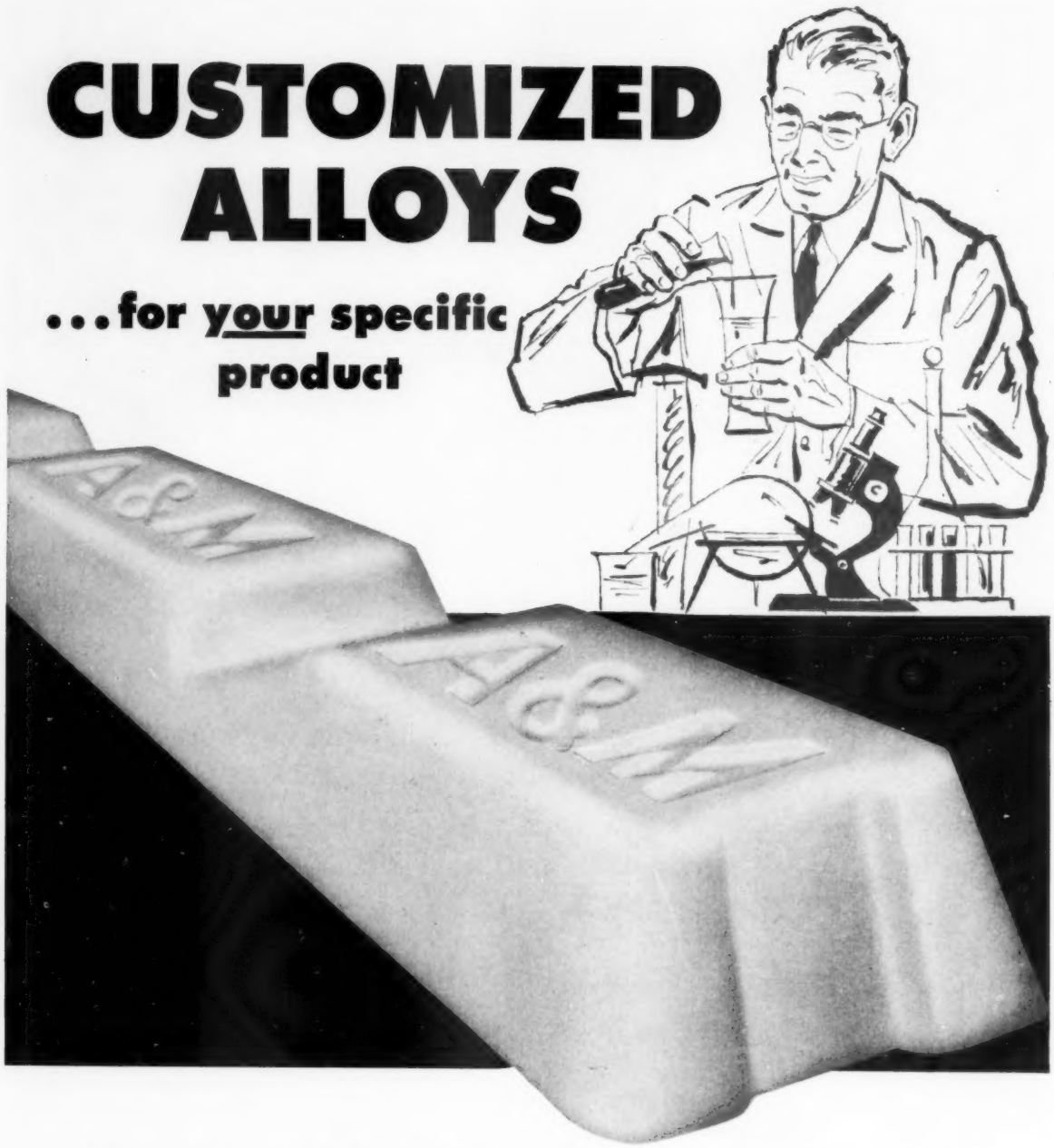

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That's what engineers at Lear, Inc., did. It was the only practical way.

27 **DIE CAST FISHING REEL FRAME**
By die casting the frame of a fishing reel, Shakespeare Co. was able to sell it at a price which was attractive to a great number of fishermen.

28 **DIE CAST PLUMBING FIXTURES**
Die casting was the only process which could economically meet these requirements for plumbing hardware: intricate detail, fine finish, low cost.

28 **TWO-IN-ONE PERMANENT MOLD CUTS COSTS**
Monarch Aluminum Mfg. Co. kept costs down for a customer by designing a permanent mold that could be used for two different types of castings.

29 **INVESTMENT CASTING CUTS MACHINING COSTS**
Compare for yourself two sets of parts. They're exactly alike in every detail except one – there's a big difference in what it costs to make them.

30 **NEW CAMERA "IMPOSSIBLE" WITHOUT MAGNESIUM**
That's what Longines-Wittnauer's vice president says about its new camera-projector, which uses five magnesium die castings for its case.

32 **STRENGTH AND SHAPE AT LOW COST**
Crimping dies must be able to withstand a force up to 6500 lb, and they must be shaped right to do their job properly. Investment casting gives both.

34 **ELIMINATES COSTLY BRAZING AND MACHINING**
Costs were cut 30% when International Nickel Co. investment cast a part which formerly was machined in three pieces, then brazed together.

34 **"HANDSOMEST HANDGUN" USES DIE CASTINGS**
The Newton-New Haven Co. developed a die cast aluminum frame and trigger guard to help meet High Standard's goal of a better revolver.

35 **REDESIGN TO DIE CASTINGS PAYS OFF**
Because sand cast window catches kept breaking and didn't work right, Michael-Flynn Mfg. Co. turned to die castings which cost less, work fine.

36 **DIE CASTING DIES ON JOB FOR 20 YEARS**
You can't ask for much better proof of satisfaction than to have a customer still use die castings made from dies more than 20 years old.

38 **ONE UNIQUE EXTRUSION PROVIDES FLEXIBILITY FOR DESIGNER, CONSUMER**
Only an extrusion could meet Lightolier, Inc.'s exacting demands for a floor-to-ceiling lamp that was unique, practical, versatile, and attractive.

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Many drive-ins will remain open this winter, and patrons will be kept warm by individual heaters. The elements are aluminum die castings.

75 **ADCI STANDARDS, SERIES E**
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When production requirements rose, Rochester Products Div. of General Motors went into high-volume finishing of zinc die castings.

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Bostitch used a little ingenuity and a scrap piece of plywood to eliminate rejects because of chemical stains on painted surfaces.

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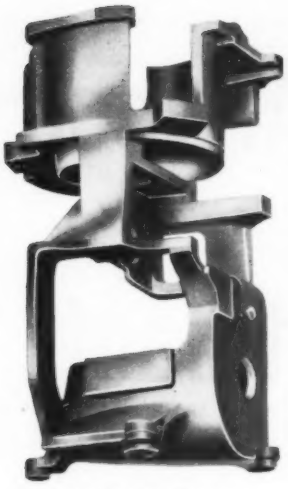

COMPLEXITY

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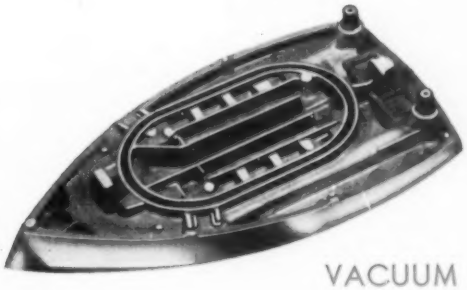

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says: MILTON R. HOEPPNER
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McCulloch Corporation
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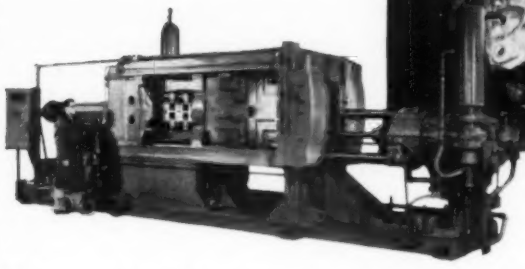

"Orders were building up for our largest outboard motor die castings, so we decided to step up production by farming out the dies for the aluminum castings. It was a good idea except for one thing—no one else in this area owned an 800 Ton Lester—the kind we were using to cast the 30 lb. block for the motor.

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LETTERS

the readers' forum

REPRINTS

We would appreciate receiving a reprint of your article "One Casting Machine for Aluminum or Zinc" from the June, 1959 issue of PRECISION METAL MOLDING. —J.C.D., metallurgist.

We are always glad to furnish tear sheets as long as our supply lasts. Reprints should be ordered within 90 days of publication, 250 reprints is a minimum order.—ed.

LEAD DIE CASTINGS

I would appreciate any information you have available as to a source for production quantities of small die cast lead drapery weights. Finished parts weigh approximately 1 ounce and measure 3/32" x 1½" x 1½".

Also, if available, manufacturers of small lead die casting equipment to produce the above part. J.S.

A list of die casters who say they can die cast lead has been sent; also a list of manufacturers of small die casting machines.—ed.

WELDING ALUMINUM

We are very much interested in your article under the heading of "High Strength Welds In Aluminum" with Tens-50 holding the spotlight.

You state that the Tens-50 alloy is easily extruded into filler rod on a production basis and that this material is from Report No. NAV 20-1-15 and supplemental Report No. NAV 20-1-15, both issued by Navan Products, Inc.

Will you kindly furnish us with this information or advise more specifically where we can secure it. —A.O.

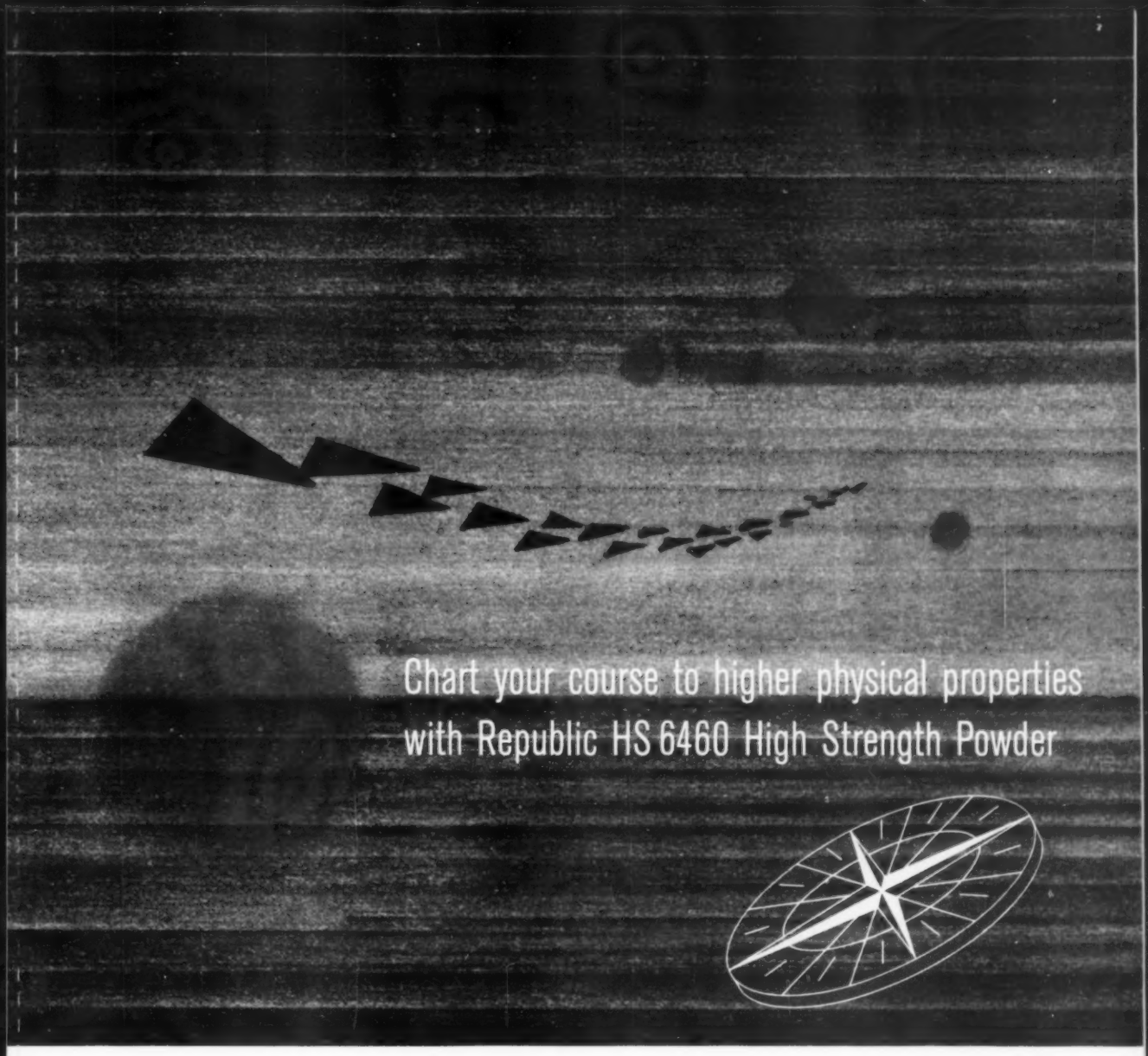
Complete information on Tens-50 alloy can be secured from Navan Products, Inc., International Airport, Los Angeles, Calif.—ed.

VACUUM DIE CASTING

Please send me a listing of vacuum die casters in the mid-western area.

Your magazine has been very helpful to us in the past several months of receipt. Is an indexing

continued on page 74



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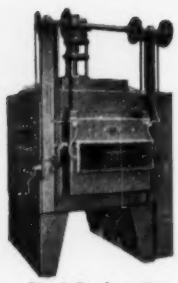
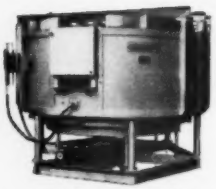


Electric Box Convection Furnace

Tool-Room Furnace with Quench

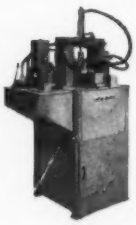


Electric Rotary Hearth Furnace

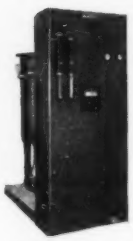
Graphite Resistor Tube Furnace

"Circ-O-Therm" Laboratory Oven

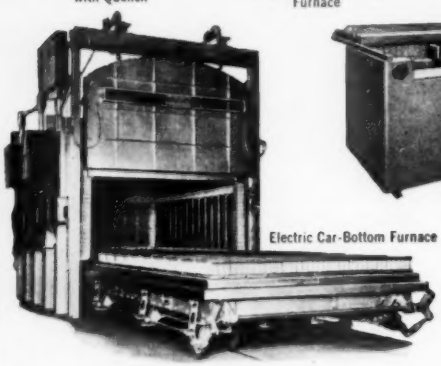
Rotating Tray Oven



Coke or Ore Testing Furnace

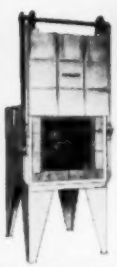


Electric Endothermic Atmosphere Generator



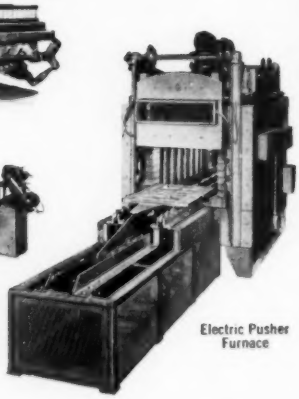
Electric Car-Bottom Furnace

Immersed Electrode Salt Bath Furnace



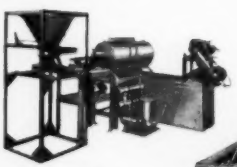
Electric Draw Furnace

Gas-Fired Endothermic Gas Generator

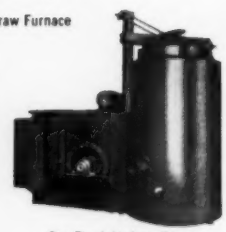


Electric Pusher Furnace

Gas-Fired Salt Pot Furnace

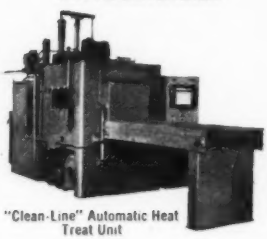


Electric Shaker Hearth Furnace

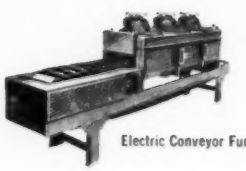


Gas-Fired Airdraw Furnace

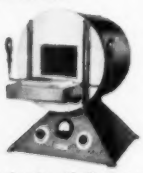
Electric Vertical Retort Furnace



"Clean-Line" Automatic Heat Treat Unit

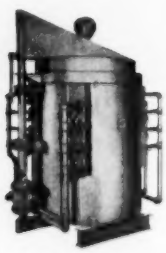


Electric Conveyor Furnace



Laboratory Muffle Furnace

Combustion Tube Furnace

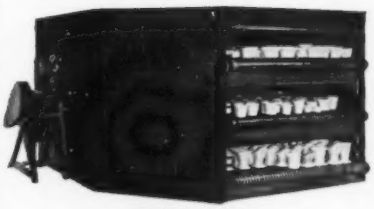


Gas-Fired Pit Furnace

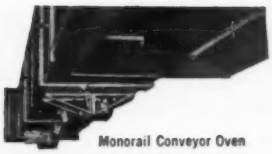
What's going on at HEVI-DUTY?

SUDDENLY, IT'S THE BIG LINE OF INDUSTRIAL HEATING EQUIPMENT!

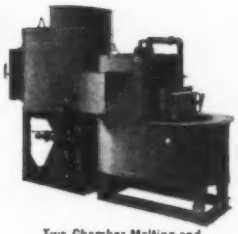
Industrial Furnaces and Ovens, Electric and Fuel • Laboratory Furnaces • Dry Type Transformers • Constant Current Regulators



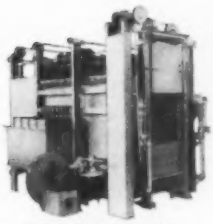
Multi-Level Belt Dryer



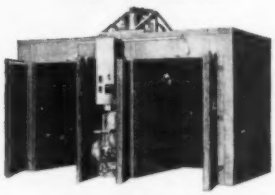
Monorail Conveyor Oven



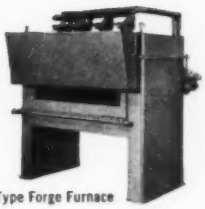
Two-Chamber Melting and Holding Furnace



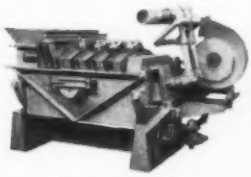
Fuel-Fired Reverberatory Furnace



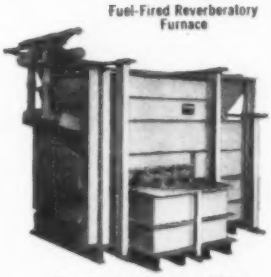
Two-Chamber, Rack-Loaded Oven



Slot Type Forge Furnace

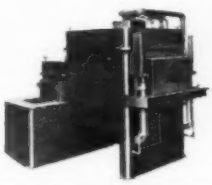


Cradle-Type Melting Furnace



Reverberatory Aluminum Melting Furnace

Gas-Fired Tray Loaded Oven

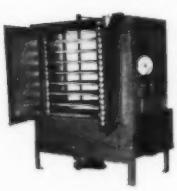


Double Chamber Dry Hearth Melting and Holding Furnace

Magnesium Melting and Holding Furnace

Gas-Fired Barrel Melting Furnace

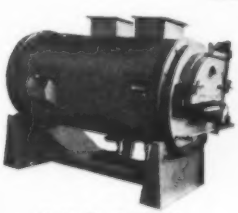
Electric Resistance Holding Furnace



Electric Tray Loaded Oven

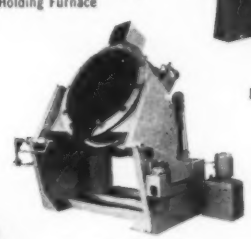
Iron Pot Melting Furnace

Double Chamber Aluminum Melting and Holding Furnace



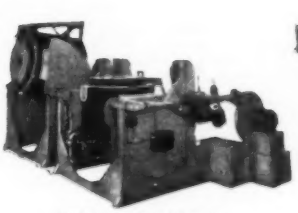
Double Chamber Barrel Furnace

Stationary Crucible Melting Furnace



Hydraulic Tilt Iron Pot Furnace

Electric Crucible Holding Furnace



Mechanically Tilted Crucible Melting Furnace

Gas-Fired Crucible Melting and Holding Furnace

It was planned for years . . . a big, brand new plant with the latest production facilities . . . the acquisition of several heating equipment companies . . . and suddenly, Hevi-Duty offers the largest, most complete line of electric and fuel fired furnaces and ovens in the industry. Shown here are representative units available.

Write for complete details. Perhaps that expensive "custom-built model" you need is a standard item or a simple adaptation from the *big* Hevi-Duty line.

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CASTING ABOUT

technical news of applications
& processes involving precision metal moldings

A DETERRENT to the wider use of aluminum castings and forgings has been the low hardness on wearing surfaces. Normally aluminum castings, a piston for example, will have a room temperature hardness of about 110 Brinell.

This may be overcome now. An announcement from the Aluminum Co. of America research laboratories of an aluminum hard surfacing alloy applied by welding techniques says that hardnesses as high as 250 Brinell can be attained. So far, the alloy has been applied to zones of high wear, such as piston ring grooves, brake drums, valve seats, and sheaves. What's more, the alloy is reported to hold its high strength at elevated temperatures. At 500°F, the new alloy is about four times as hard as cast aluminum. Heat resistance is also generally good so that aluminum parts, with zones of the hard welding metal, are expected to find wide application in automotive and similar parts.

TUNGSTEN CAN BE FABRICATED into an amazing number of complex shapes, if the temperature is right. Cold, it's almost completely unworkable, but from warm to hot it can be rolled, forged, spun, blanked, extruded, and drawn.

The working range starts around 750°F and extends to 3000°F. Because of its high thermal conductivity and low specific heat, tungsten has to be worked rapidly. For large reductions or deformations, the operations must be done in sequence, with reheating between operations. A lot of the work is done at temperatures where steel is liquid.

The unique properties of tungsten make it a preferred material for many applications, but inability to fabricate the metal has prevented its wider use. Some typical properties of tungsten are given in the table. With the new fabricating methods developed by Fansteel Metallurgical Corp., the metal may become more important as a structural material.

	Tungsten	Tantalum	Molybdenum	Copper	Iron	Titanium	Beryllium
Tensile Strength							
Room temp. (X1000)	100-500	100-150	120-200				
500°F	175-200	35-45	36-65				
1000°F	50-75	15-20	20-30				
Young's Modulus							
Room Temp.	$59x10^6$	$27x10^6$	$46x10^6$				
500°F	$55x10^6$	$25x10^6$	$41x10^6$				
1000°F	$50x10^6$	$22x10^6$	$39x10^6$				
Thermal Conductivity(1)	0.399	0.130	0.382	0.94	0.18	0.036	0.385
Coef. of Expansion(2)	2.2	3.6	3.05	9.3	6.5	4.7	6.8
Specific Heat(3)	0.034	0.356	0.061	0.09	0.11	0.126	0.425
Melting Point, °F	6152	5425	4752	1979	2804	3074	2343
Density g/cc	19.3	16.6	10.2	8.96	7.87	4.54	1.84

(1) In cal/cm²/cm/°C/sec. (2) In in./in./°F. (3) In cal/g/°C.

JOINING ALUMINUM to itself or to other metals by soldering is not new. In fact, soldering aluminum with zinc is about the oldest method known for joining aluminum. The catch has been in the flux, for the most part. Now, new fluxes, new solders, and new techniques have been developed by Alcoa research which promise a greatly-expanded field of application for soldered aluminum structures. Joints made with the new solders have been reported superior to brazing in several applications.

On socketed tube joints which were exposed to a corrosive atmosphere for over a year, little or no damage could be detected. Tensile, hydrostatic, and fatigue tests on aluminum soldered to copper tubes showed joints stronger than those made by more conventional methods. Also, aluminum-to-aluminum socketed tube joints had greater strength than the tube itself.

RESISTANCE TO CORROSION is one of the outstanding advantages of metallic titanium. But handling moist chlorine gas presents a corrosion problem of gigantic proportions. Non-metallic materials can be used, if they're properly selected, but service life is short, particularly if there's appreciable abrasive wear.

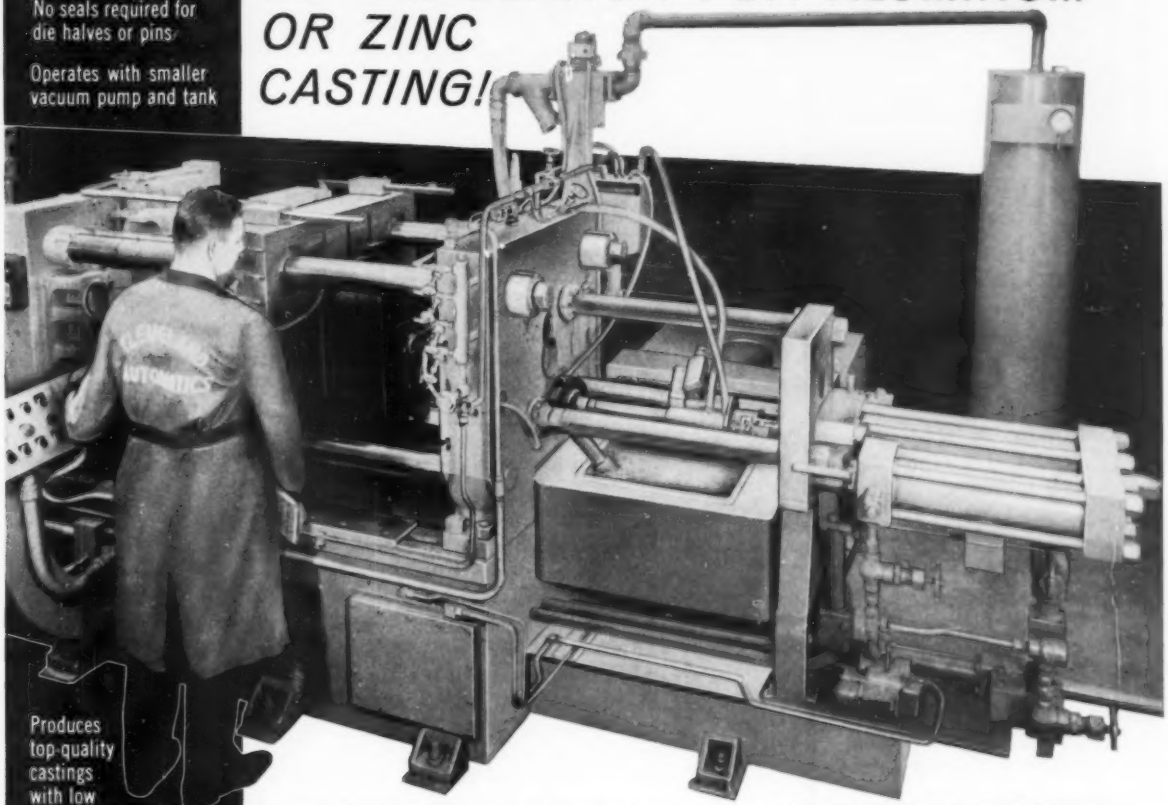
Mallory-Sharon had a problem of handling titanium tetrachloride in one of its plants. A blower with a 24" impeller operated at 3500 rpm. First attempts were made with a plastic coated steel impeller, but the high peripheral speeds threw the plastic so that imbalance resulted. Average life of the impellers was 2 days.

An impeller of commercial titanium was put in and after 10 months of continuous use has shown no appreciable wear or corrosion. Cost is competitive with units fabricated from nickel-base alloys and the rate of corrosion is about 1/80th that of the nickel-base material.

WITH THE MORTON SYSTEM...

CLEVELAND TAKES THE LEAD IN VACUUM LADLING AND DIE EVACUATION FOR ALUMINUM OR ZINC CASTING!

- Lowest cost of any vacuum system
- Proven in production
- No shrouds or hoods to confine die area
- No seals required for die halves or pins
- Operates with smaller vacuum pump and tank



- Produces top-quality castings with low injection pressures
- Provides fast operation with less operator attention
- Machine maintenance reduced to minimum
- Less flash—cleaner dies—fewer rejects
- Automatic die and machine lubrication including plunger tip
- Template-programmed operation sequences
- The ultimate in machine operation flexibility

IN OPERATION in Cleveland's Die Casting Development Center is the 400-ton Cleveland 400-N Machine shown above. This Cleveland incorporates the lowest cost, most efficient vacuum ladling and die evacuation system in existence today!

For months, this machine has been producing an extremely thin-walled aluminum casting, having near-zero porosity and superb surface finish, at rates exceeding 300 shots per hour.

The casting is produced with a 4" dia. shot cylinder from a 1000 lb. charge in the accumulator, and by automatically ladling the aluminum and evacuating the die and shot cylinder from the vacuum system, which operates under a vacuum of 29.6 inches of mercury. No shrouds or die seals, etc., are used. (If desired, a 2000 lb. shot pressure, or an intensifier to provide 5000 lbs., can be supplied.)

SIMPLY SWITCH FURNACES TO CHANGE FROM ALUMINUM TO ZINC PRODUCTION

Note the unique furnace arrangement shown. This is a 30KW induction melting furnace on wheels, riding on rails. The entire furnace can be rolled out from under the shot end. By mounting another die, rolling in a second furnace charged with a different alloy or metal, and re-programming the machine controls, this Cleveland is quickly back into production!

A few of the many advantages of Cleveland Vacuum Die Casting Machines are itemized at the left. To convince yourself of Cleveland's superiority in vacuum die casting, schedule your visit to see this machine in operation, or call in a Cleveland field engineer.

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BETWEEN THE LINES

The editor's viewpoint on articles in current and forthcoming issues

THIS ISSUE PRESENTS MOSTLY case history type of articles to show both design and production engineers how the metal forming processes covered in the editorial section of PRECISION METAL MOLDING can cut costs. As our editorial points out, direct labor saving isn't the only way to cut manufacturing costs. The cost cutting ideas start on page 25.

MACHINING DIE CASTINGS is frequently necessary. The good designer, however, takes advantage of the flexibility of the die casting process to limit second operations to drilling, tapping, surfacing and similar low-cost operations. Because these castings are so accurate and so reproducible from casting to casting it is possible to set up fully automated machining lines. These lines can, furthermore, use quite simple, inexpensive holding devices rather than costly jigs and fixtures. How Rochester Products Div. of General Motors Corp. machines and applies a chemical conversion coating – all on a fully automated production line is described in a finishing article starting on page 45.

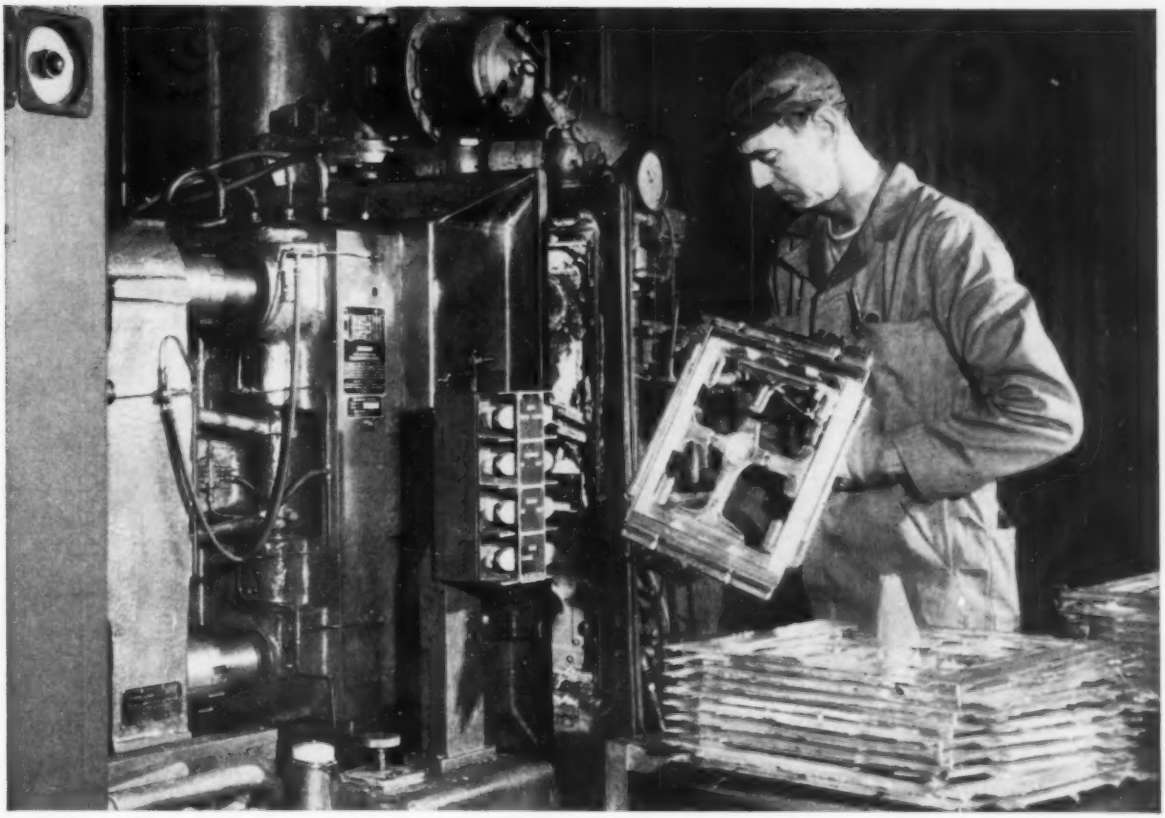
EXTRUSION IS BIG BUSINESS today. It accounts for a large chunk of the aluminum that is fabricated, is an important factor in the red metal industry and is becoming more and more important in the shaping of steel. It is a major consumer of hot work die steels and becoming more important steadily. In past years, the emphasis in extrusion has been on standard mill shapes (rods, tubes, etc.) and architectural applications. But designers are beginning to really appreciate what extrusions can do in industrial applications. That's why our November issue will largely be devoted to the extrusion industry. How big it is, how much metal it consumes, how much die steel is used and where extrusions are applied in industry. Also as a special feature of this section we'll have a report from a leading company in the lighting field on how they purchase extrusions.

ALSO IN THE NOVEMBER ISSUE will be a three part article on some of the newer techniques for forming shell molds for investment casting. These shell molds permit faster production of the final castings, allow far larger parts to be made, and lower costs generally. Most investment foundries have some form of shell mold available for their customers when this method shows an economic advantage.

ONE ADVANTAGE WHICH extruded shapes have over cast shapes is the ability to take a good, clear, anodized coating. In this respect they are similar to rolled and drawn aluminum. In the November issue, Mr. R. R. Pettit of the Metal Industries Div., Diversey Corp. tells how to anodize aluminum extrusions. The article is detailed and is aimed at telling how to do anodizing. No detail, however minor, has been omitted.

THE INDUSTRIAL DESIGNER plays an important part in today's economy. If any product is to sell it must have eye-appeal. This is especially true in connection with consumer goods. To point up both the importance of industrial design and to show many examples of good design, the Albright Art Gallery of the Buffalo Fine Arts

continued on page 18



At San Jose Die Casting

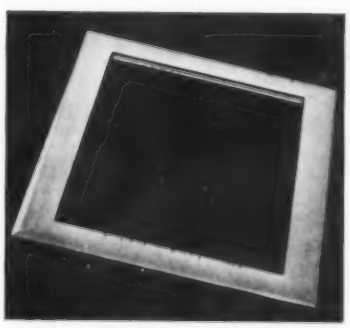
REED VACUCAST CUTS REJECT RATE BY 90%

produces higher quality, lower cost zinc castings

"I'm fully convinced that the REED Vacucast unit is a real business builder, an absolute must in assuring customers the highest quality, lowest cost zinc castings available," says William H. C. Bartlett, President of San Jose Die Casting, San Jose, California.

"Our customer, a large manufacturer of lighting fixtures, experienced a great deal of difficulty in obtaining high quality hardware finish castings. The reject rate was running well over 10%. Since we have been producing these parts on the Vacucast, rejects have been less than 1%. This has meant a considerable cost savings, since the rejects were not apparent until after the polishing and plating operations were completed. Parts now require only one buffing operation with a cotton wheel before plating. Particularly important is the absence of porosity along the trim line, which had formerly caused plating failures."

REED Vacucast gives you many advantages: thinner wall sections, improved finishes, increased cycling time, and a much lower reject rate. And the cost of adapting existing tooling to the unit is very nominal. For complete information about the REED Vacucast system call your nearest REED Sales Engineer today.



One of two lighting fixture units produced on the Reed-Prentice 1½ Zinc Vacucast Machine.

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that ask the most

of quality on the job

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14% tungsten. High resistance to softening at high temperatures. For piercers, punches, hot forming dies.

HOTFORM

Most widely used hot work die steel. 5% chromium. High strength, toughness, resistance to heat checking. Die casting, extrusion, and hot forging dies; mandrels, etc.

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10% tungsten. High resistance to high temperatures. Punches, nut piercers, brass forging dies, etc.

HOTPRESS

Tungsten die steel with added high temperature toughness. Dummy blocks, upsetting dies, extrusion dies.

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Why Gamble on Your Die-Castings?

You know they're "on-grade" when produced by DOLLIN under the

CERTIFIED ZINC ALLOY PLAN

Alloy purity and control rigidly maintained to meet strictest metallurgical specifications

How can you be sure your zinc die-castings conform to the strict chemical composition limits for maximum mechanical and physical properties?

The answer is simple . . . buy your zinc die-castings from DOLLIN—one of the licensed producers of die-castings under the Certified Zinc Alloy Plan. Be sure your supplier displays the C-Z seal—that's all you need to know.

What does C-Z mean to you? It means that your zinc die-castings will have the maximum in high mechanical strength, dimensional stability, good machineability and fine surface finish. No risk of casting deterioration in service due to variations in alloy composition.

Do C-Z die-castings cost you more? No — because DOLLIN (like other members of the C-Z Plan) is a leader in the field, with the experience, equipment, engineers and techniques to improve designs, suggest economies and efficiently produce your die-castings at lowest cost. Price buying, without C-Z protection, can be a costly gamble.

LICENSED PRODUCER

How the Z seal protects buyers of zinc die-castings

Die-casters licensed under the C-Z plan regularly must submit sample castings to independent laboratories for analysis. In addition, field representatives periodically visit each plant *without notice* to select samples from each die-casting machine, for testing. Every sample must test "on-grade" to retain the valuable C-Z license.

DOLLIN CORPORATION 25th ANNIVERSARY 1934-1959 Die-Castings

Dollin invites you to submit prints or samples of parts for engineering advice and quotation, without obligation. Write for 16-page brochure showing Dollin's facilities and services.

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Dollin Corporation, 614 So. 21st St., Irvington 11, N. J.

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DOLLIN Zinc & Aluminum DIE-CASTINGS

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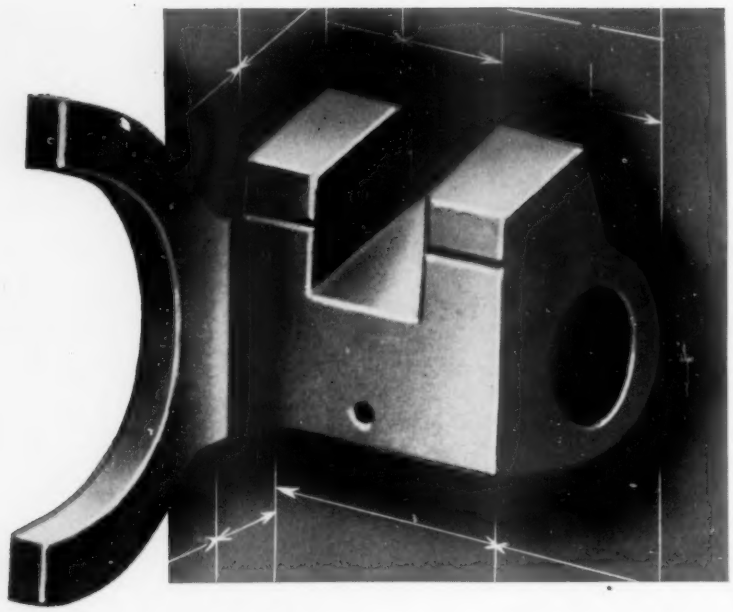

this new part brings outstanding cost reductions...

The photograph is of a shifter fork used in the transmission of a very popular garden tractor in volume production.

Clearly evident is the economy that can be achieved by powder metallurgy over other previously used methods. The elimination of practically all machine work effects striking cost reduction.

Made of pure powdered iron, infiltrated with copper to give added strength and ductility, this part is intended to meet the higher physical properties of wrought metals.

The user of this part naturally presented his problem to Bunting first.

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BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE OR SINTERED METALS. ALCOA® ALUMINUM BARS

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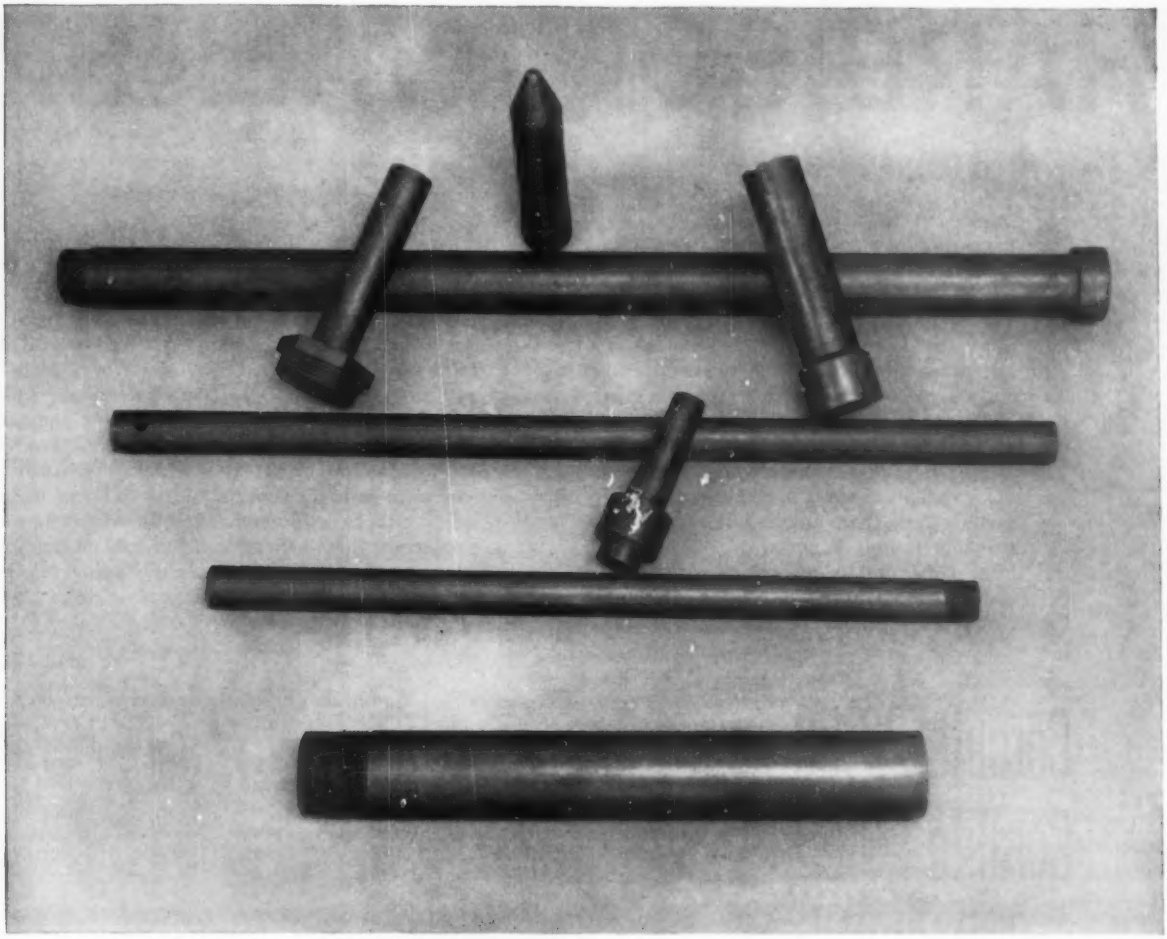
BETWEEN THE LINES

continued from page 14

Academy put together an outstanding exhibit called "20 Century Design: U.S.A." Included in the 1096 articles shown were many which made use of metal parts fabricated by one or more of the PMM processes. In December many of these parts will be shown along with the castings, extrusions, and molded parts which are used in them. This should be an outstanding display of good industrial design through the use of precision molded metal parts.

DIRECTORY TIME IS COMING close again. The first questionnaires for the annual die casting directory have been sent out. Every company which receives a copy of a questionnaire should be *sure* to return it properly and fully filled out. That's the only way we have of giving you a listing. Even if we know what you make or what service to the industry you render we can not list you without a signed questionnaire. We receive hundreds of letters a year asking where to buy castings or supplies for the die casting shop. If you want to be sure of a reference when these letters are answered make sure you're listed in the directory. Our normal method of reply is to send either a complete directory or a photo-copy of the appropriate pages. So get your replies in at once. Incidentally, this will be the most complete die casting directory published to date. In addition to listing jobbing die casters, the 1960 directory will also carry a listing of suppliers to the die casting industry.

A BIG ADVANTAGE OF SINTERINGS is not having to machine the parts after they are delivered. This is generally true, but there are still lots of cases when machining has to be done. To get the best results the production shop has to know how to handle sinterings. With the proper tools, the right feeds and speeds and a knowledge of the composition of the sintering it can be machined easily and rapidly. An article which gives the latest information on machining sinterings is coming up in the near future. Watch for it.



Intricate cylinders made of REFRAX refractory—some of which are shown here—have a wide variety of uses, including: sampling tubes, syphons, pyrometer protection, submerged heating, stoppers, pouring spouts, diffusion tubes for anode baking, pouring nozzles, riser channels, launder linings and parts for aluminizing of sheet and wire.

Close-tolerance, tubular parts that...

At 2450 F have M. R. of over 5000 psi*

What material is this that looks like a metal, can be formed into shapes formerly possible only with metals—yet has far superior properties? It's REFRAX® silicon-nitride-bonded silicon carbide: a readily-formable (tolerances of ± .005 in./in.) refractory that retains its stable properties up to, and sometimes beyond 3000 F!

WHAT ARE THESE PROPERTIES? REFRAX parts, for example, offer armor-like resistance to abrasion—either from the effects of high-velocity entrained particles or from direct, frictional contact. They're also extremely resistant to thermal shock. And they're not affected by most acids or corrosive slags . . . even *highly-reactive* materials. Shapes are made to actual size, thus avoiding grinding, threading, finishing, etc.

EXAMPLE OF BENEFITS: One customer of ours had tubes that were immersed in molten aluminum. These were made of cast iron and corroded through after only 70 hours. Contamination of the melt was "distinct." The REFRAX tubes that have replaced the cast iron have already exceeded 500 hours . . . and there's no contamination. The reason? Aluminum *can't wet* REFRAX parts; dross can't penetrate.

These and other properties of REFRAX refractory parts could mean similar savings for you. Get complete information. Write today to Refractories Div., The Carborundum Co., Perth Amboy, N. J.; Dept. R-109.

*Modulus of rupture is 5600 psi @ 2450 F.

CARBORUNDUM

Registered Trade Mark

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HARBISON-WALKER

anticipates the refractories needs of the expanding aluminum industry

Within the last couple of decades the production of aluminum metal in the United States has trebled and the number of its alloys has increased manyfold. Rapid evolutionary developments created the need for refractories to meet new conditions. The severity of corrosion, more destructive impact accompanying furnace charging and the necessity of avoiding contaminants in order to meet rigid alloy specifications—these among other factors have become increasingly important.

Since the first commercial production of aluminum and its alloys, Harbison-Walker brands, primarily of alumina-silica and high-alumina compositions, have continued to fulfill the ever-growing demands. Through unceasing research several refractories, recently developed specifically for aluminum melting furnaces, possess definitely superior properties for maximum durability and best quality of metal. Harbison-Walker's CORALITE XX (85% alumina brick) has established excellent service records in aluminum furnace bottoms and side walls. Several modifications with enhanced properties now are in commercial production. These unique refractories especially suited for aluminum melting furnaces are here briefly described.

Coralite 22-58

CORALITE 22-58 is a stabilized aluminum phosphate-bonded brick containing approximately 85% alumina. It has exceedingly high strength and withstands greater impact and abrasion. Its resistance to wetting and penetration by the molten metal are properties of paramount importance. CORALITE 24-59 is the hard-fired variation, having still higher mechanical strength.

Coralite 3-59

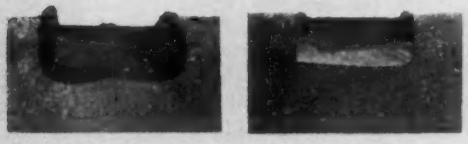
CORALITE 3-59 is a very hard-burned brick containing approximately 85% alumina. It is made with a special bond (patent pending) which contributes to its remarkable strength. It is very resistant to penetration and reaction with molten aluminum.

CORALBOND

CORALBOND is a phosphate bonded high alumina mortar developed specifically for use in aluminum melting furnaces. It is very outstanding in its resistance to penetration and corrosion by aluminum alloys at the furnace operating temperatures.

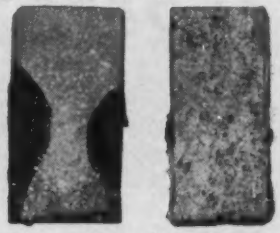
Laboratory tests illustrate superior properties

CUP TEST



Photograph of accelerated cup test with molten aluminum alloy—at 1700°F for 30 hours—showing relative degree of penetration between normal high alumina brick on the left and CORALITE 22-58 on the right.

IMMERSION TEST



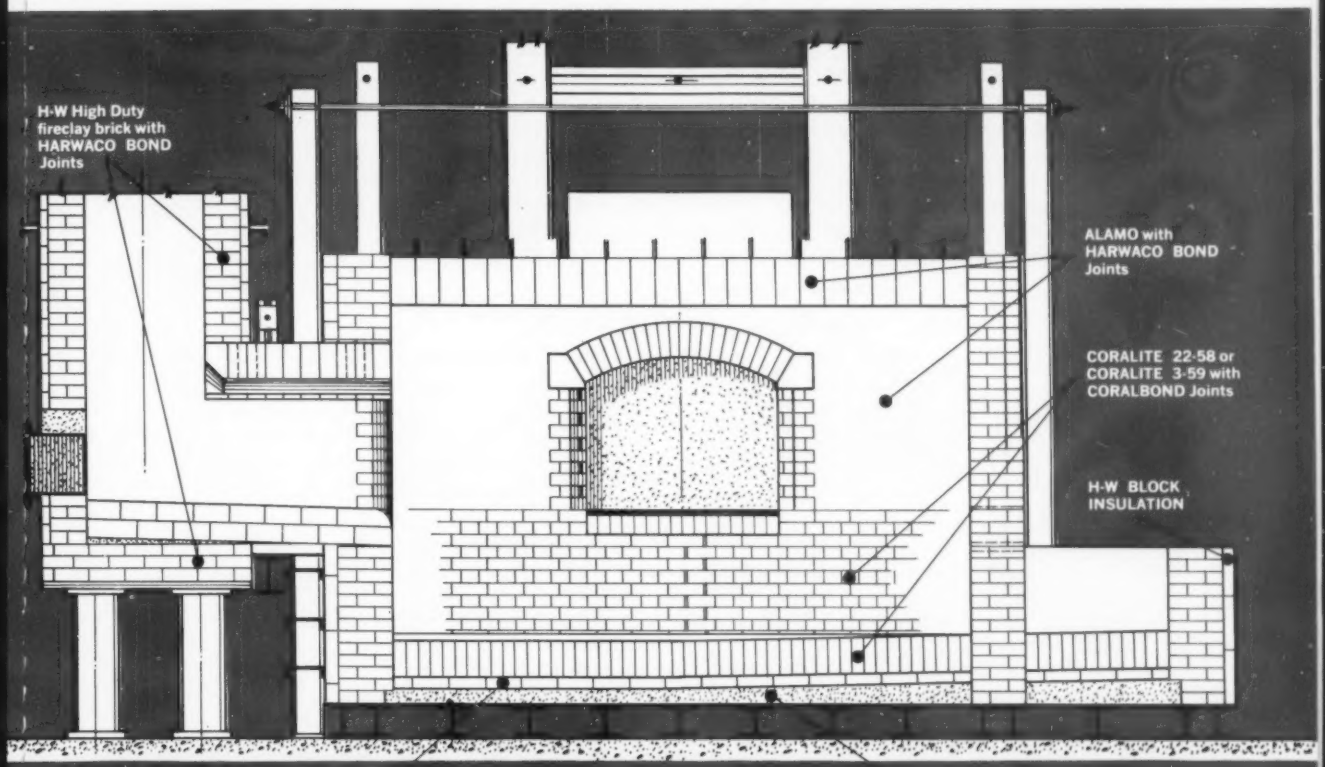
These brick, which were immersed in aluminum alloy at 1400°F for nine days, show contrast in degree of penetration or wetting between a normal high alumina brick, left, and CORALITE 3-59, on the right.

Harbison-Walker

World's Most Complete Refractories Service

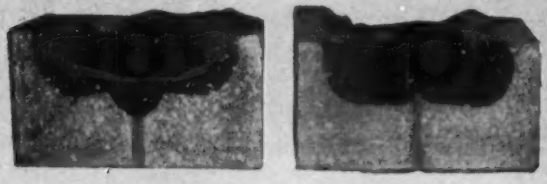
GENERAL OFFICES *PITTSBURGH 22, PA.*

RESEARCH


H-W High Duty fireclay brick with HARWACO BOND Joints
ALAMO with HARWACO BOND Joints
CORALITE 22-58 or CORALITE 3-59 with CORALBOND Joints
H-W BLOCK INSULATION
ANCHOR (60% Al_2O_3)
H-W EXTRA STRENGTH CASTABLE

Schematic drawing of an aluminum melting furnace

MORTAR JOINT TEST



Photograph of Laboratory "cup tests" with molten aluminum alloy, show striking difference in resistance to penetration and corrosion between a widely-used air-setting bonding mortar at the left and the CORALBOND joint at the right. Among many mortars of widely different compositions, CORALBOND—as illustrated in this test—is unmatched.

Leadership in Refractories Through Constant Research

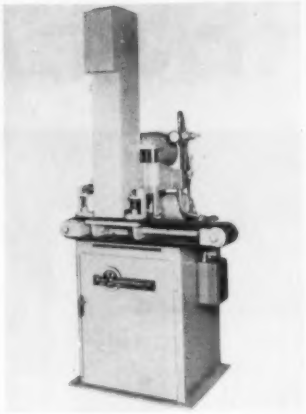
GARBER RESEARCH CENTER

Refractories Company
AND SUBSIDIARIES

Circle No. 27 on Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Qualified readers can get complete details on these products. Use the Reader Service Cards. You'll find them facing page 80 of this issue.



FOR ABRASIVE BELT, FLAT GRINDING & POLISHING

The Model JC finishing machine, designed by ACME MFG. CO., is ideally adapted to abrasive-belt finishing operations on flat surfaces of die castings, forgings, bars, etc. The machine has a 6" wide abrasive belt and can handle parts having stock thickness up to 3". The unit features a pneumatically tensioned belt, positive manual or automatic belt tracking, micro-meter grind pressure adjustment, v-belt drive, and variable control of belt feed. It can be equipped for either wet or dry finishing operations.

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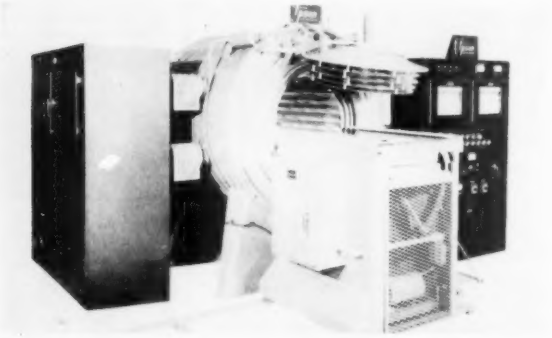

HEAT TREATING FURNACE IS AUTOMATIC

An automatic high vacuum cold wall type heat treating furnace has been developed by ISPEN INDUSTRIES, INC. The unit has a work space of 24" wide, 36" deep, and 12" high. It has an operating pressure of 1 micron Hg; input of 75 kw.; operating temperature of 2275° F.

The furnace is adaptable for copper and for nickel brazing of flat stainless assemblies. Other uses of the V-300 vacuum furnace include hardening, tempering, drawing and annealing refractory metals, reactive metals, etc.

Circle No. 236 on Reader Service Card

NOZZLE FOR DIE LUBRICATION

COLUMBUS AUTOMATIC LUBRICATION CO. has introduced an adjustable, no-drip atomizing nozzle for use with automatic die lubrication systems.

The nozzle features a simple adjustment for precise control over quality of flow and size and shape of spray pattern. A positive shut-off at the nozzle orifice insures no-drip operation. Manifold type air and liquid connections allow the nozzle assembly to be removed without disturbing the mounting or hose lines.

The nozzle, # 2000, is designed for operation at atomizing pressures from 1 to 100 psi. A simple mounting bracket makes it easy to set the nozzle in a fixed position.

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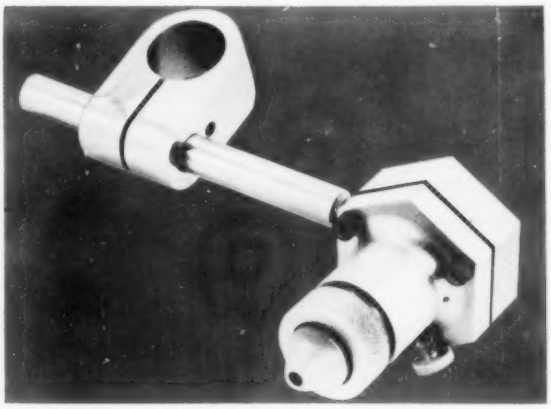

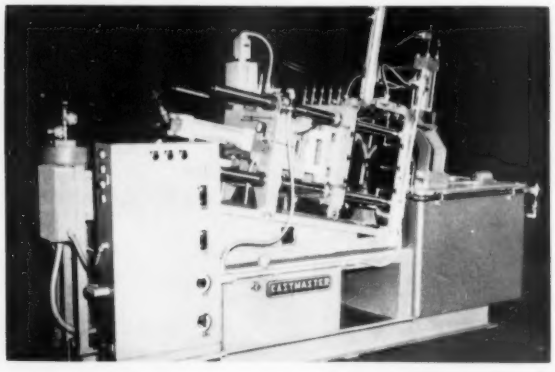

100-TON DIE CASTER IS FAST

Up to 1,000 shots per hour – of small zinc die castings, is possible with this new 100-ton hot chamber die casting machine developed by CAST-MASTER H-P-M DIV., KOEHRING CO.

Called the 7Z, the machine features inclined platens and injection cylinder to keep nozzle drippings to a minimum and to permit castings to fall freely.

Die mounting plates are 21½" x 21½"; space between tie bars is 13½" x 13½"; maximum die stroke is 8"; injector cylinder stroke is 6½".

Circle No. 238 on Reader Service Card

continued on page 52

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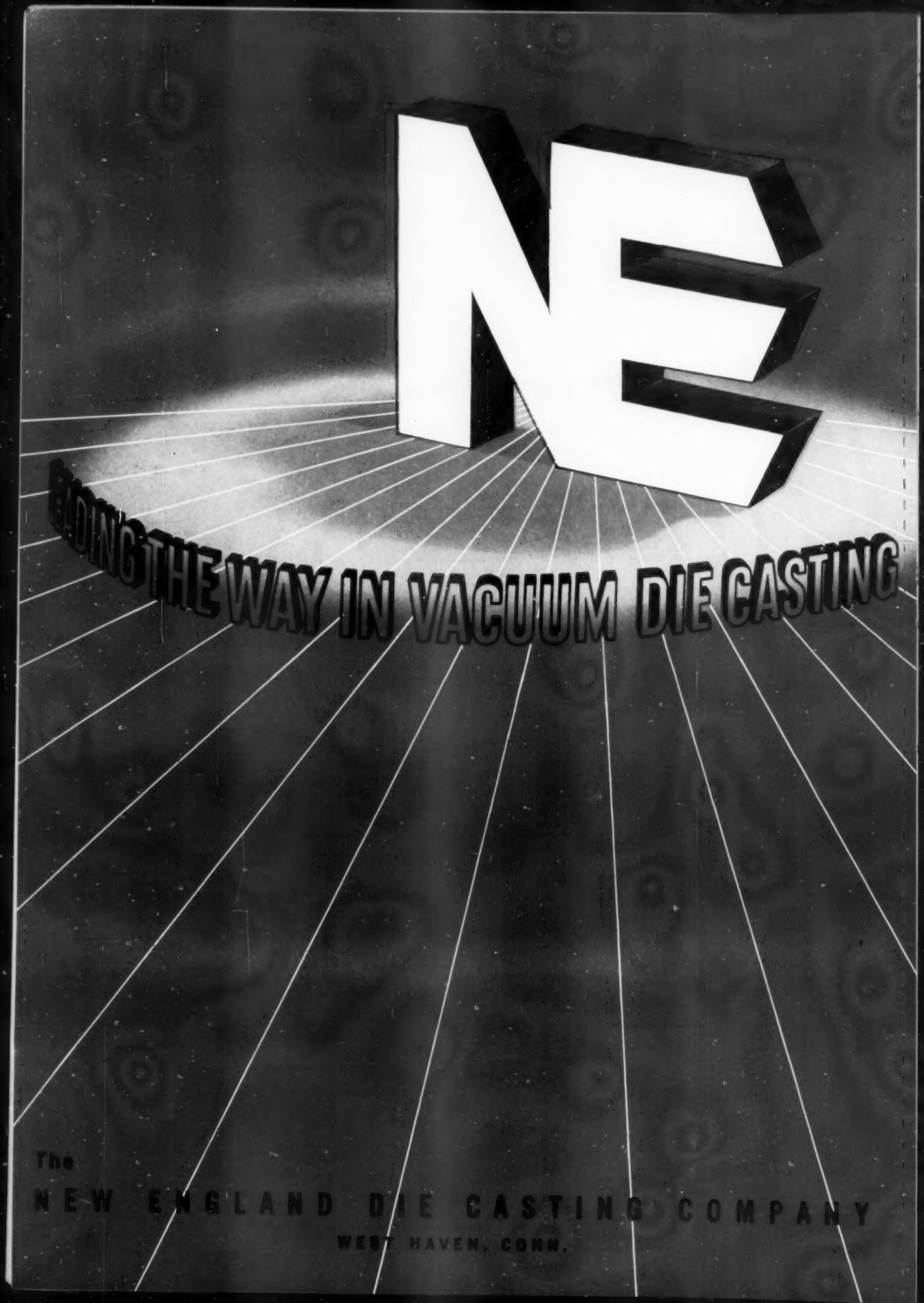

NE
LEADING THE WAY IN VACUUM DIE CASTING
The
NEW ENGLAND DIE CASTING COMPANY
WEST HAVEN, CONN.

Design for Lower Costs

I'VE BEEN TALKING with a lot of people in our industries these past several months. Almost all of them report expanding business, some of them a business boom. They're buying new production machinery and are expanding their plants. One fellow I talked to today said, "We're building a big addition onto our plant and I'm out every day hunting machines. Orders are coming in so fast that we've eaten away a big inventory. Our customers call up long distance and cry because we can't ship within 24 hours." That's an expanding economy all right, but let's look at how it's expanding.

All of these people I talk with are either making parts by one of the PMM processes or they are suppliers to these fabricators. So the answer is pretty clear cut. The manufacturers of goods who need fabricated metal products are turning more and more to the PMM processes because they can turn out a better product at a lower manufacturing cost.

Designers and production men everywhere know that they have to reduce both the direct labor and such indirect costs as stocking, inventory, inspection, and weight. What's more, they know that the best way to do it is to use parts made by one or more of the PMM processes.

Take something as simple as a drawer or cupboard pull. You can design a complicated sand casting and make it one or six at a time. Then machine it all over, surface finish it and end up with no two pulls exactly alike. Isn't it simpler, and more logical, to simplify the design if necessary and then to make an extrusion from which the desired shapes can be cut? Finish two surfaces, drill and tap mounting holes and the job is done. Or if it can't be extruded, then die cast it with the added advantage of more complex shape possible and possibly even a little less finishing.

Or how about a really complex part? Say a gimble for a gyroscope. It's generally made of high strength steel and accurately machined. As an investment casting you get all the strength you need, plus, and this is a big plus, lighter weight, much less machining and very little scrap loss.

But we've barely scratched the surface on the uses of parts made by these precision processes. True, the automotive industry and the appliance industry use parts made by most of these methods. But out of a tremendous industrial plant such as we have in this country it's a bit silly to see over 50% of the precision molded parts going into only two industrial applications.

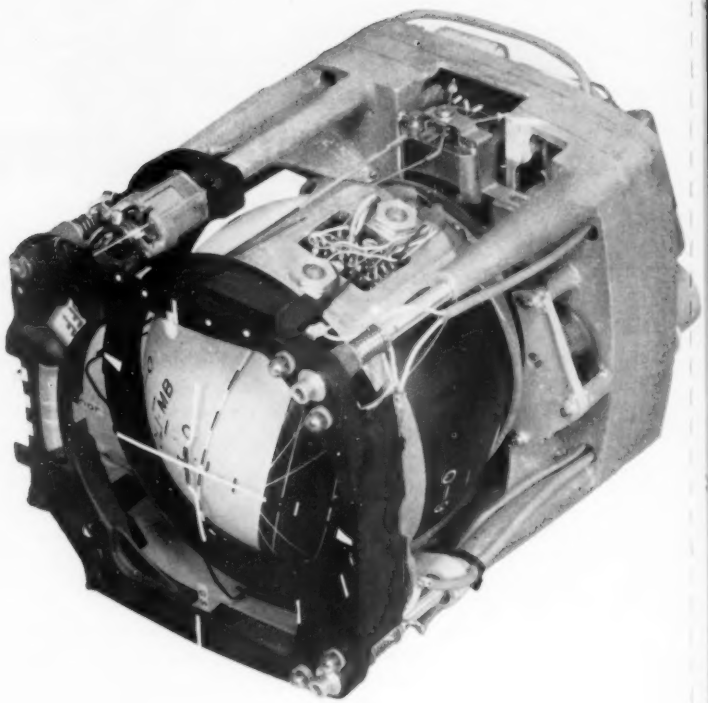
To give design and production engineers a bit of an idea of where and how PMM parts are used we are showing applications in 12 different industries. The list could be greatly expanded if such expansion would serve a useful purpose. It's doubtful if it would. The one thing to remember is that through the use of one or more of the processes covered by the case-histories presented a better product can be made at a lower manufacturing cost.

P. R. Kalischer

EDITOR

DESIGN FOR
INVESTMENT CASTINGS

Complex Part? Use Investment Casting



"THERE IS only one way to make this part: Investment cast it."

That's the conclusion the production engineers at Lear, Inc., reached after studying a prototype they had machined from a 1½" aluminum plate.

The casting is a mask for a flight reference indicator. In addition to masking out light, the mask serves as a structural member supporting itself and small accessory items. Also, it improves the appearance of the indicator.

From both engineering and purchasing standpoints, the only way to make the mask was by investment casting. There is no other way to get the detail and complexity unless the part were machined out of plate. This would be too expensive.

Here the the advantages of the investment casting:

- Where needed, the wall thickness is cast to .050.
- The four different radii that come from the same center line on the I.D. can be formed.
- It is light.
- The casting is strong enough to serve as a structural member.

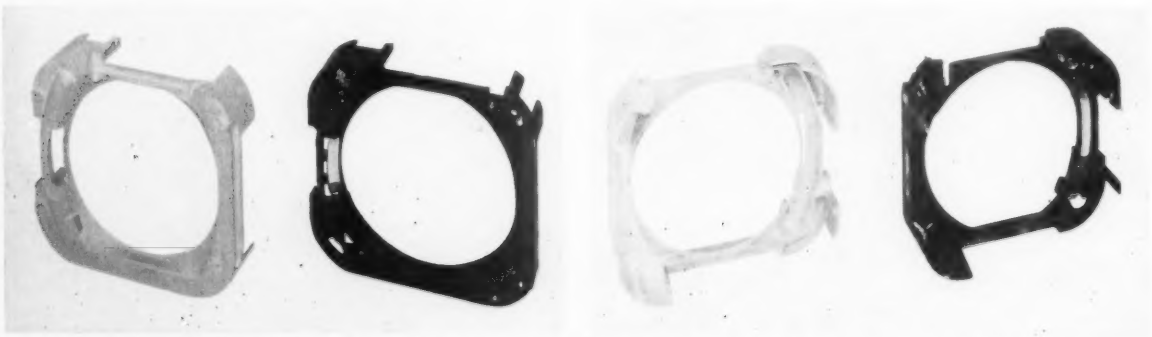
In addition to meeting these musts, investment casting added these features:

- Low tooling cost, low cost per casting.
- Short lead time for tooling. Lear had a sample casting of the mask in a week.
- Good appearance.
- Excellent surface finish.
- Only minor machining is required.

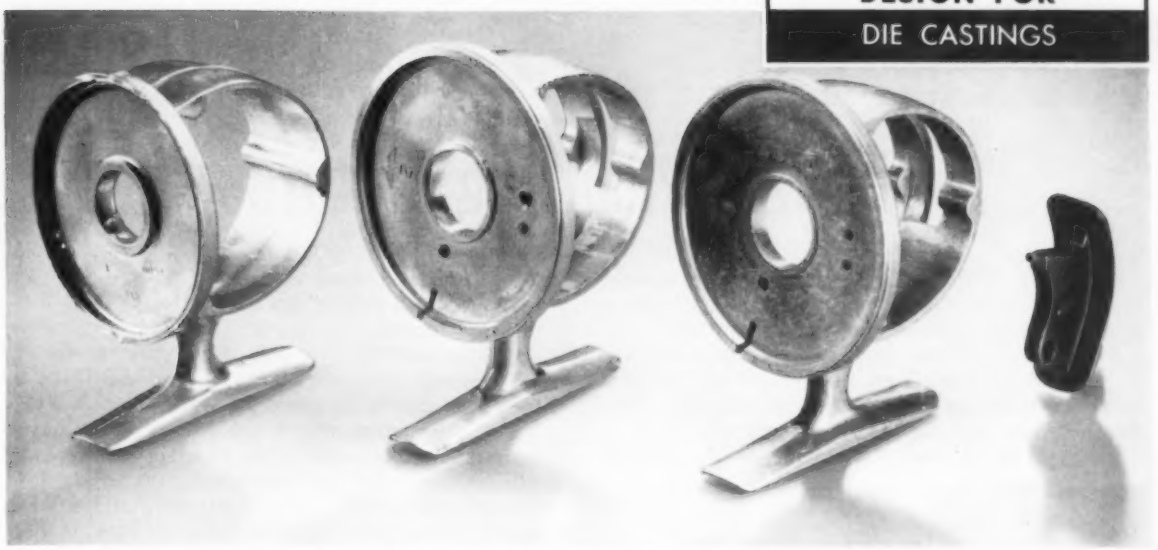
The mask is investment cast in 356 - T7 aluminum alloy by Hodge, Inc. Tolerances on the castings are held to ±0.003 on the .050 thick wall. All other tolerances are held to ±0.005.

To insure a perfect circle, Lear skin bores the I. D. Then, the exterior of the casting is profiled and the holes are drilled and tapped. Finishing consists of deburring, black anodizing, and black paint.

Corrosion is no problem. The entire indicator is hermatically sealed in a glass case.



INDICATOR MASK (both front and back views) is shown as investment cast (phantom) and as finished.



REEL FRAME takes final form with few machining operations. Lever is at extreme right.

Fishermen prove worth of . . .

Die Cast Fishing Reel Frame

DIE CASTING the frame for the Shakespeare Company's push-button Wonder Cast fishing reel kept costs low enough to place the reel in a price range appealing to a great number of fishing enthusiasts. In fact, the attractive price, general appearance, and fine service record have made the reel the company's most popular model.

In its finished form, the frame serves as a housing and a mounting for the reel's mechanism. Also, the base of the frame attaches the reel to the rod. These combined features required a complex shape. In addition, the part had to be light to insure proper balance of the rod when the reel is attached to it. Finally, the frame had to be free of defects and reasonably corrosion resistant. Aluminum die casting was the most practical way to meet these requirements.

For light weight, the frame is cast in 380 aluminum alloy by The Kalamazoo Die Casting Co. and Litemetal Diecast Inc. The casting weighs approximately 2 oz. The tapered base is difficult to cast in aluminum. At the thinnest point the wall is cast to 0.040 inches thick. This wall thickness, plus the fact that the base is tapered, would be difficult to obtain by other manufacturing methods without additional costly machining.

Only minor machining is necessary to ready the frame for assembly. First the flash on the as cast frame is removed. Then the frame goes to a straight line machining operation where the following operations are performed:

1. Spot mill the I.D., at the rear side plate boss to provide clearance for the internal parts.
2. Drill 3 holes in the face.
3. Bore the center hole, and turn the O.D. on the face.
4. Straddle mill the two sides.
5. Saw a slot for the push button lever.
6. Saw a slot in the face.

BARREL FINISHING

After machining, the castings are barrel finished for burr removal only by processes and equipment from the Roto-Finish Co. The frames are deburred, 200 at a time, in a Roto-Finish No. 45 barrel. Limestone chips are used with Roto-Finish #100 Compound in the barrel. Cycle time is 2 hours. After deburring, the frames are Alodine coated. Then, the internal parts are sub-assembled. All that remains, is to drill and tap 6 holes and mount the side plates to the frame. The completed unit is then painted.

The push-button lever also is die cast in 380 aluminum. The only operations necessary to finish the lever are drilling one pin hole, deburr by barrel finishing, and Alodine coat and paint. The lever is then ready for assembly to the reel.

This reel is used mainly for fresh water fishing, and corrosion is only a slight problem. Corrosion does present, however, a definite problem for the company's Sea Wonder Reel, which is used for salt water fishing. The frame for this reel is also die cast in aluminum. To protect the frame the casting is anodized, then painted. With proper care, this will provide corrosion protection for the life of the reel.

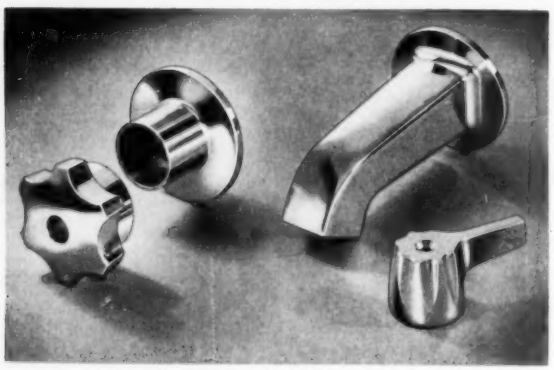
DESIGN FOR
DIE CASTINGS

Die Cast Plumbing Fixtures

INTRICATE DETAIL, fine finish, low cost manufacture . . . these conditions define the production problems of the plumbing hardware industry.

By ignoring any one of the three requirements, a lot of different manufacturing methods are possible. But if all three are to be met – and they must be – then only zinc base die castings are the answer.

The fixtures illustrated are made by the Latrobe Die Casting Co. They represent a change from sand castings which resulted in a saving of at least 75% in production costs.



As cast and trimmed, only one of the items shown requires any machining. The tub spout must have one hole tapped.

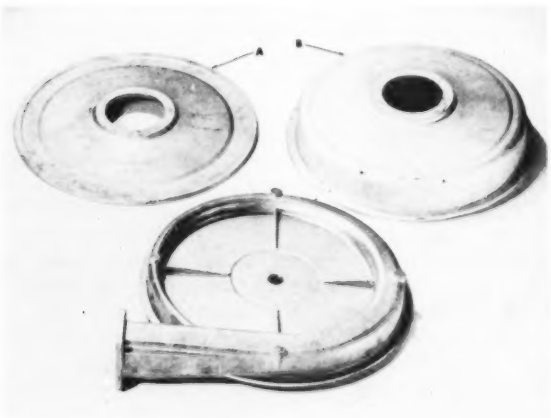
The parts are cast with a hardware finish and require only minor polishing and buffing before plating with copper, nickel, and chromium.

The better surface finish of the die castings, which makes surface finishing much less costly, is obvious. Less apparent is the fact that if the handles, for example, were sand cast, the serrations could not be put in except at very high cost. Another advantage of die casting is the much smoother hole in the tub spout to give a smoother, more uniform water flow. The bore of the flange is cast to finished tolerances, whereas a sand cast part would require machining. The cored holes in the handles, both screw holes and serrated gripping holes (these are not shown) are used as cast – further saving machining charges.

These parts again emphasize this point: How else would you do it economically?

DESIGN FOR
PERMANENT MOLD CASTINGS

Two-in-One Permanent Mold Cuts Costs

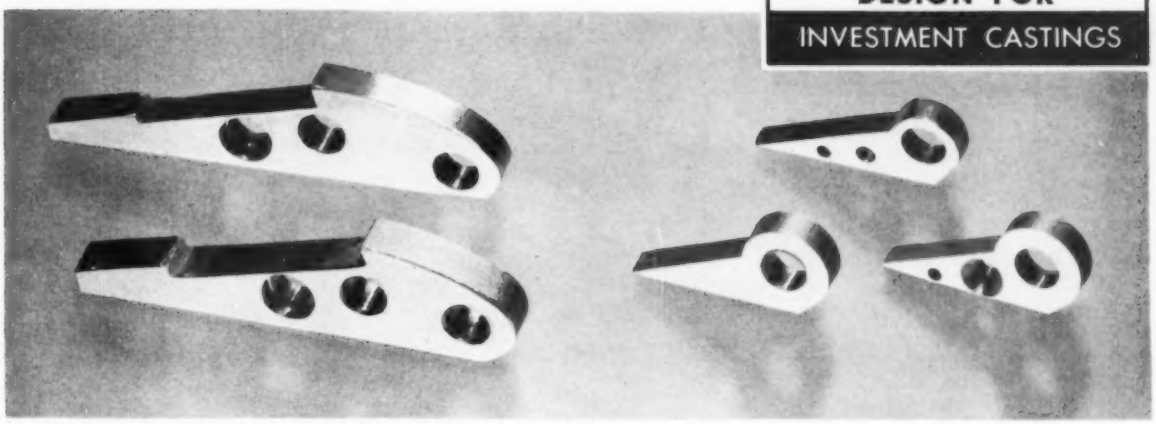


SMALL RUNS of front and back covers for a furnace blower housing are being produced economically by Monarch Aluminum Mfg. Co. as permanent mold castings. Design of the mold is a big factor in keeping costs down.

Only one mold is required for two different types of front covers. The mold for cover A is quickly converted into a mold for cover B by removing an insert.

These were previously made as sand castings. However, the customer required a uniformity of appearance and a consistency of dimensions within a normal tolerance of .030 inch, particularly where concentricities were concerned. This was easily obtained, along with a flatness tolerance of .060 inch. These tolerances, combined with a comparatively good RMS value, eliminated machining of the bottom surface.

The overall diameter of the assembled unit is 21¼ inches. Total weight of the housing is 16¼ pounds.



WHICH IS WHICH? One of these sets of roller mounts is machined, the other investment cast. The answer's in the text.

The parts are identical, but . . .

Investment Casting Cuts Machining Costs

THERE'S A DIFFERENCE between the two sets of roller mounts illustrated on this page. They may look alike, but the only similarities are the size, shape, and the number of holes in each. The difference is in the way they're made. And it is this difference that provides a savings for the Orthopedic Frame Co.

Before we tell you which is which, let us look at what these roller mounts must do. Two large and two small mounts go on each Rolo-Dermatone, a precision skin grafting machine. The four mounts hold three rollers in position. The two front rollers are attached to the larger mounts, ahead of the surgical blade. The back roller is attached to the smaller mounts. The depth of the skin graft to be taken is determined by the height of the two front rollers. These are calibrated by a lever that comes in contact with the top of the large mount. The instrument can be set to make grafts from 0.005 to 0.030 inches thick. Each setting notch equals 0.0025 inches. Because of this precise calibration, the top of the large mount has to be held to ± 0.0005.

In addition, the mounts have to be made of a material that can withstand the corrosive elements of human blood and high sterilizing temperatures.

Now let's identify the parts in the photo. The two mounts at the top were made in what the company once thought was the only way. They were machined out of stainless steel bar stock. The bottom three mounts in the picture are investment castings.

Early in the production of the roller mounts, the company discovered two things about machining them out of bar stock: (1) Functionally, they filled the requirements. (2) They were too expensive.

Machining these parts required highly skilled machinists and special machines. But, more important, it took a lot of time. That was what really pushed costs up. It used to take 44½ manhours to machine just 200 large roller mounts. To machine 200 of the small mounts took 35½ manhours.

An analysis of the problem by an engineer from Hitchiner Mfg. Co. showed that the roller mounts could be investment cast. It could be done in the stainless steel alloy they wanted, and it wouldn't be necessary to change the design of the mounts. Only minor machining would be required on the casting, and the mounts could be cast at a considerable savings.

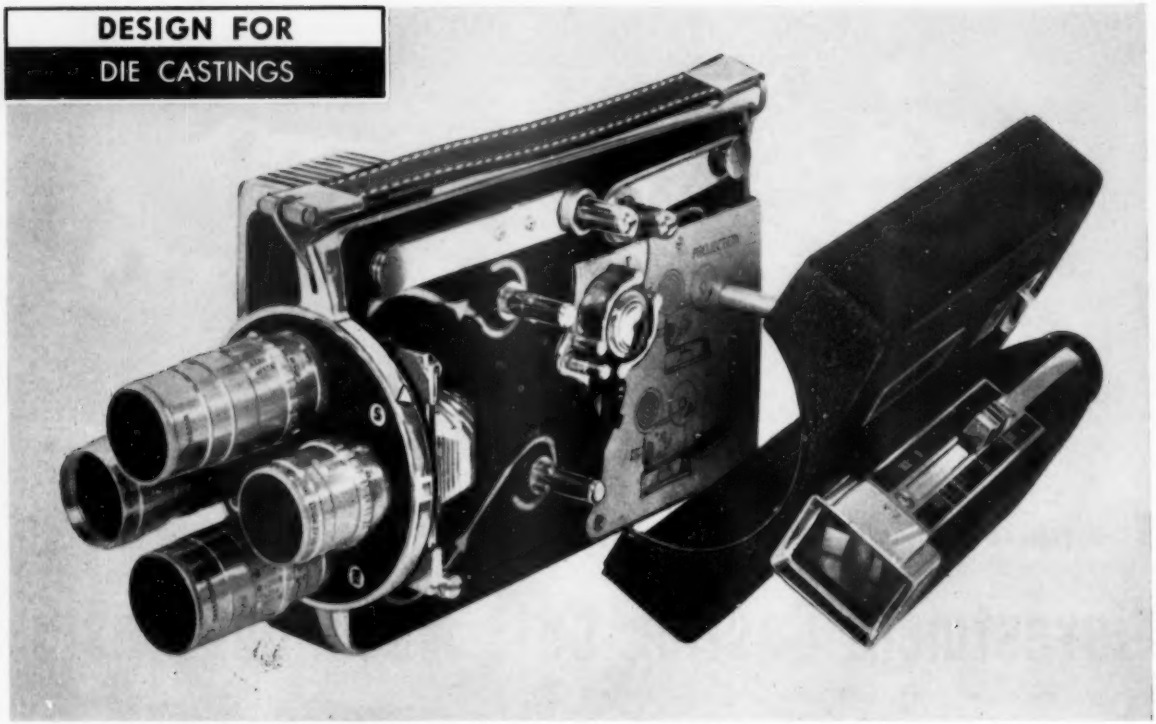
When the company decided to have the roller mounts investment cast, they found these differences:

Machined part	Investment Casting
LARGE MOUNT: 44½ hrs. to finish 200 pieces	44½ hrs. to finish 623 pieces
SMALL MOUNT: 35½ hrs. to finish 200 pieces	7½ hrs. to finish 300 pieces.
Cost Comparison	
LARGE MOUNT: 100 units	46 units
SMALL MOUNT: 100 units	32 units

In addition, there were these advantages:

- No need for highly skilled labor.
- Men and machines were freed for other work.
- The castings are uniform in shape.
- Low reject rate. There's about 1 in 1,000.
- Excellent finish. The semidull finish of the casting does not reflect surgical lights. The machined mount had a reflective surface.
- There was a wide choice of alloys to choose from that could be investment cast.
- The casting had a greater yield in tension than the machined part.
- The same tooling that was used for drilling, tapping and counterboring the holes on the machined mount could be used on the casting.

DESIGN FOR
DIE CASTINGS



MAGNESIUM DIE CASTINGS make up the case of the world's first combination camera-projector.

Using a die cast case . . .

New Camera "Impossible" Without Magnesium

FIVE PRECISION magnesium die castings are housing the world's first combination camera-projector, the Wittnauer Cine-Twin. Longines-Wittnauer Watch Co. is using magnesium for the case primarily to save weight and maintain structural strength.

Use of magnesium rather than the metal initially considered has resulted in a weight reduction of 28.62 ounces per unit. This is a 31 percent saving, since the weight of the 8 mm camera-projector is just 4 pounds.

Research revealed that 4 pounds would be an ideal weight for the unit, exclusive of the projector base. A heavier unit would have been less easy to handle. In a lighter unit, use of a telephoto lens would have seriously affected balance and multiplied camera movement.

The Dow Chemical Co.'s die casting plant produces the five magnesium die castings used in the highly-precise assembly.

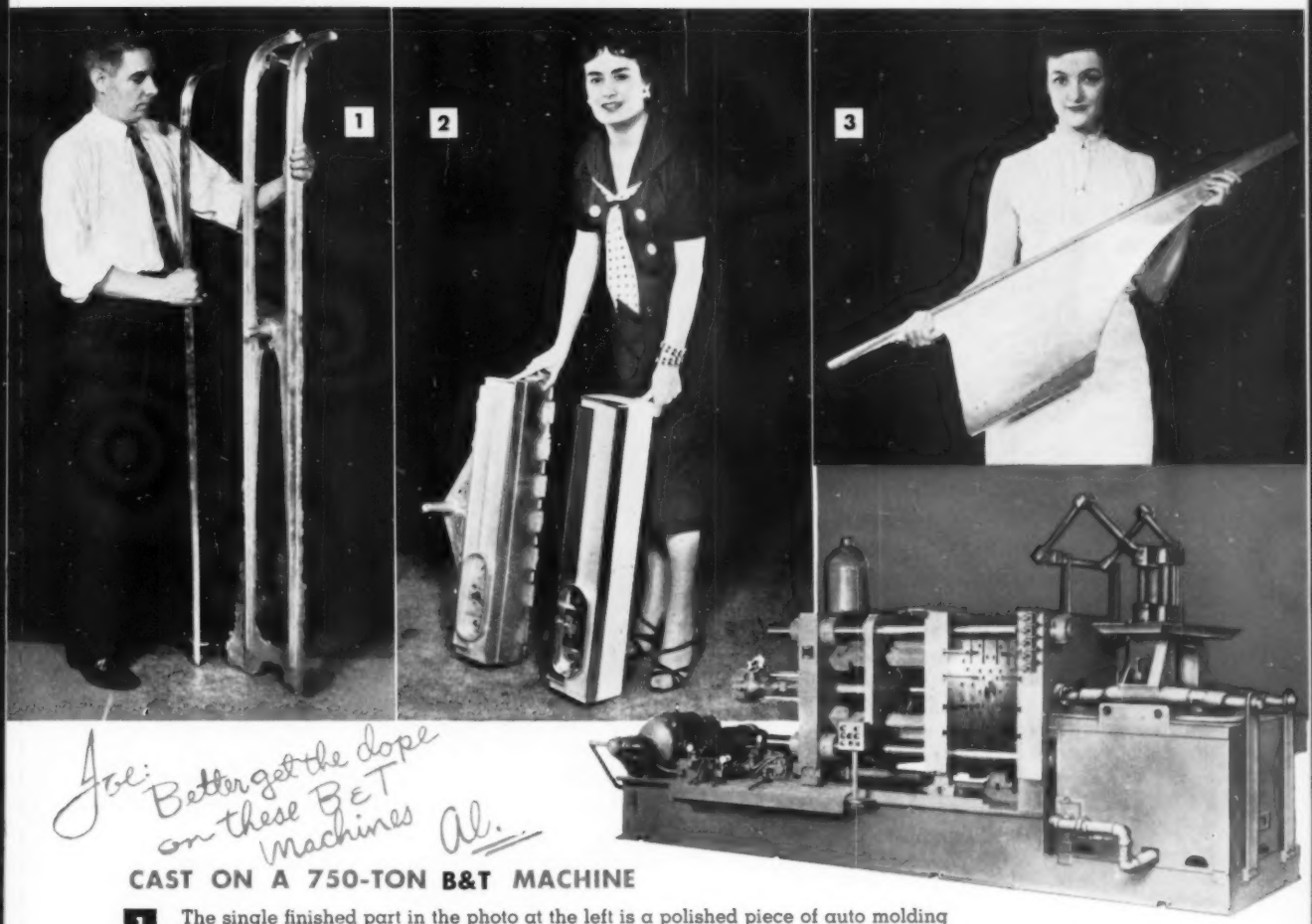
The Cine-Twin has features which a few years ago would have been considered impossible to market at its present price:

- Four-lens turret fitted with standard taking lens and projector lens. Wide-angle and telephoto accessory lenses are available.
- No manual rewinding. The camera is electrically driven by three flashlight batteries.
- Safety signal monitor indicates the energy level of the batteries and checks the electrical circuit for proper continuity.
- Drop-in film loading eliminates sprockets and film threading.

Conversion from camera to projector requires only positioning of two reel arms, setting the unit on the projector base, and plugging in the power cord. It takes less than 30 seconds.

Partly because any weight over 4 pounds for the camera-projector was considered impractical, Alan R. Cartoun, Longines-Wittnauer vice president, says, "We can point to any number of features on this unit that are unique in this price range. But whatever the features, this product would have been impossible without using magnesium."

HOLLAND DIE CASTING COMPANY, with skill and experience, produces extraordinary castings on B&T DIE CASTING MACHINES!



Joe: Better get the dope on these B&T machines Al.

CAST ON A 750-TON B&T MACHINE

1 The single finished part in the photo at the left is a polished piece of auto molding trim 64 inches long. It is produced in a two-cavity die weighing more than 8500 lbs. and measuring 84 inches in length. Weight of shot is 10½ lbs. Platens on the B&T machine are 48 inches wide and thus the 84 inch long die actually extends 1½ feet beyond each side of the machine. In successfully holding and casting this long piece the B&T 4-toggle lock-up system forcefully demonstrates its remarkable efficiency.

CAST ON A 750-TON B&T MACHINE

2 This intricate casting is the console of an automatic washing machine. The shot required weighs 14 lbs. Six 5 inch mounting studs in the back of the part are cast independently of the wall. The console has intricate coring and the instrument cluster is chrome plated and painted . . . a difficult casting to produce.

CAST ON A 600-TON B&T DIE CASTING MACHINE

3 This triangular-shaped casting is a chrome plated gravel guard for one of America's finest cars. It is made by the Holland Die Casting Company in a single cavity die weighing more than 6,000 lbs. Weight of the shot is 6½ lbs. Finish obtained is excellent. An outstanding production job for a 600-ton machine and indicative of the remarkable results obtainable with all B&T machines. Holland Die Casting Company's facilities include 12 B&T die casting machines in capacities up to 1,000 tons.

DIE RESEARCH: You are invited to use our Die Casting Research Center for experimentation and furtherance of die casting techniques.

B&T HYDRAULIC DIE CASTINGS TRIM PRESSES are exceedingly fast and efficient. Write for details.

Investigate B&T Die Casting Machines before buying any other. The line includes High-Pressure Cold-Chamber and Hot-Chamber types in capacities of 125, 150, 200,300, 400, 500, 600, 700, 800, and 1,000 tons. Write or phone for complete details.

B&T GREENLEE DIE CASTING MACHINES

A DIVISION OF GREENLEE BROS. & CO., ROCKFORD, ILLINOIS

B & T MACHINERY COMPANY

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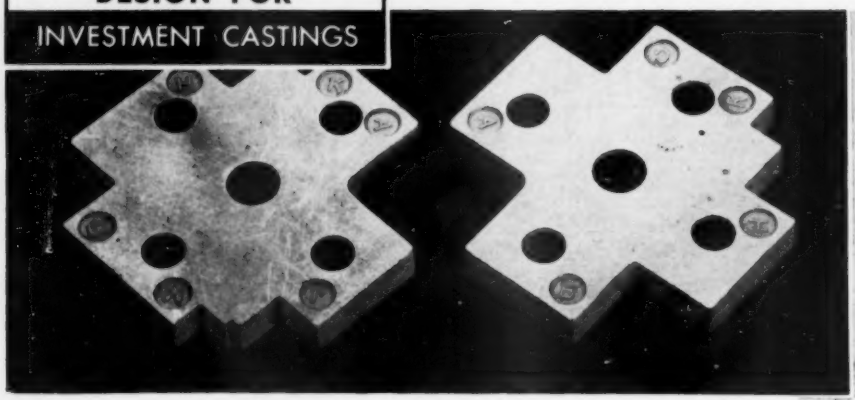
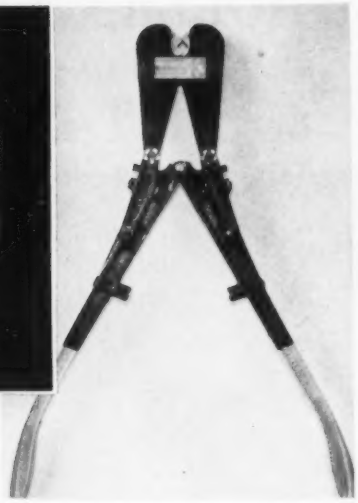
Circle No. 11 on Reader Service Card

DESIGN FOR
INVESTMENT CASTINGS





CRIMPING DIES must be able to withstand crimping force of 6500 lb.

Investment casting gives . . .

Strength and Shape at Low Cost

AFTER CONSIDERING the shape of the part, the strength required, the machining necessary, and the final cost, engineers at American Pamcor, Inc., chose an investment casting for the two dies on their Rota-Crimp. This is a multi-range hand tool for crimping solderless terminals and connectors onto wires. It is the shape of the two box crimping dies that allows the tool to crimp terminals and connectors in the entire AWG range of #8 – 4/0.

It used to be that an electrician would have to carry a kit of eight different dies to suit this range of terminals. Now, the API Rota-Crimp offers all eight sizes in one tool. These dies are permanently turret mounted. There is no need to change dies, or hunt for lost ones. All the operator has to do is turn the dies and line up the correct notches for the size terminal he wants to crimp. The selection is simplified by cast-in letters at each notch. The operator first notes the size terminal he wants to crimp. The die-selection chart on the tool tells him the proper die-letter combination to use. He loosens the locator pin, rotates the dies to the correct position by matching the letters, and replaces the locator pin.

The dies are investment cast in AISI 4140 nickel-chromium-molybdenum steel by the Hitchiner Manufacturing Co. All of the V notches and locating letters are cast in the dies. The five holes in each die have to be machined because of the ±0.0005″ tolerance that must be held. This insures that the dies will always be in alignment.

Strength is important. Maximum crimping force is 6500 lb., and the dies are subject to both flexure and compression stresses during crimping. For this reason, a steel alloy had to be used. The investment cast dies will withstand a compression load of 15,000 lb. before breaking.

Wear on the two dies is considered secondary to strength. The dies will last indefinitely, as long as they aren't abused.

In order to introduce the tool on the market, the company had to machine 100 pairs of dies. This provided a comparison between the only two ways the part could be made, machining or investment casting. Investment casting is the only precision casting method that could handle the alloy required. Functionally, there is hardly any difference between the machined dies and the cast ones. The difference was in the amount of machining required.

Machining operations on the machined dies included:

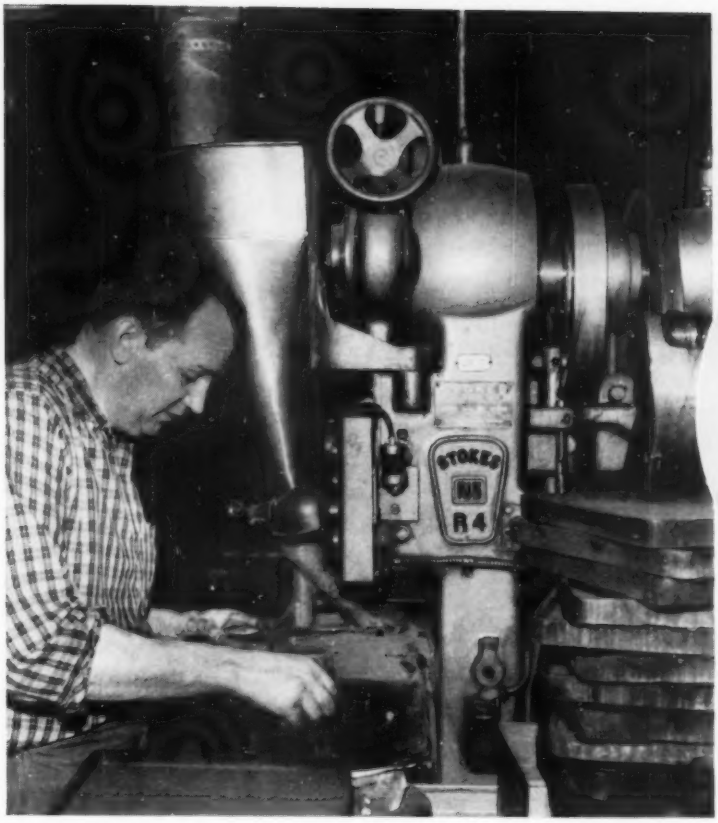
1. Cut a 2″ section from a 2″ wide flat bar, ¼″ thick.
2. Square the four sides.
3. Surface grind the bar stock from a thickness of 0.250″ to 0.240″.
4. Drill five holes.
5. Machine six V notches on the left die, five on the right die.
6. Polish and buff surfaces.
7. Stamp identification letters.
8. Heat treat to 42-46C Rockwell.
9. Cadmium plate.

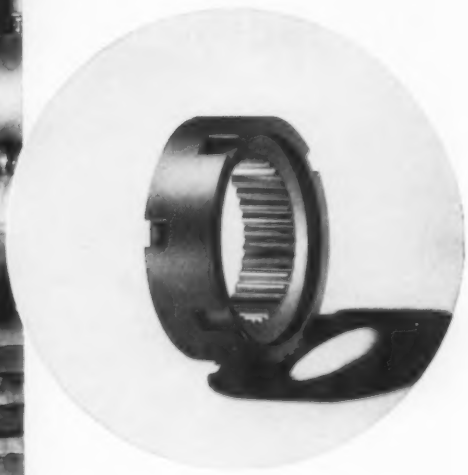
Machining operations required on the investment castings:

1. Drill five holes.
2. Grind the surfaces to insure that both are flat and parallel.
3. Heat treat to 42-46C Rockwell.
4. Barrel finish to polish crimping surfaces.
5. Cadmium plate.

Including finishing, the machined dies cost 80% more than the investment cast dies.

Barrel finishing the cast dies polishes the crimping surfaces from the as cast 125 microinch RMS finish to a 63 to 32 microinch RMS finish. The cost savings is considerable, since to do the same any other way would require expensive buffing and polishing. The 0.002″ cadmium plate serves only to protect the dies from normal atmospheric corrosion.





***68% SAVINGS** were realized on the piece shown above—a tractor part made from an iron base metal powder and having a tensile strength of 65,000 psi and an average hardness of 65 Rockwell B. The part was previously made by screw machine methods. At left, a Burgess-Norton operator checks the output of one of the Stokes R-4 Powder Metal Presses at the company's Geneva, Illinois, plant.*

"Quali-SINT"® produced by Burgess-Norton on Stokes powder metal presses

Burgess-Norton Mfg. Co., Geneva, Illinois, is a leading producer of a wide variety of parts by powder metallurgy—including cams, spacers, gears, adapters, ratchets and pawls. The company maintains its own extensive engineering, metallurgical, and chemical laboratories, tool-making, and secondary machining and grinding facilities.

Five Stokes powder metal presses are operated 5 days a week—16 hours a day—to keep pace with their production demands. The number of parts per minute depends on the part and the process being used—only minimum operator attention is required. All 5 presses were chosen by G. W. Waller, Vice President of Engineering, on the basis of "(1)—Production rate per dollar cost, (2)—Minimum maintenance requirements, and (3)—Price."

Continual research and advancement in the field of powder metallurgy has made Stokes the recognized leader in this modern industry. Stokes achievements may well be the answer to meeting your own production requirements economically—and at high speeds. Ask for complete information on the Stokes line of industrial compacting presses—or for assistance by Stokes Engineering Advisory Service. Call—or write—today.

®*"Quali-SINT" is a registered trademark of Burgess-Norton Mfg. Co., Geneva, Ill.*

Powder Metal Press Division
F. J. STOKES CORPORATION
5500 Tabor Road, Philadelphia 20, Pa.

STOKES

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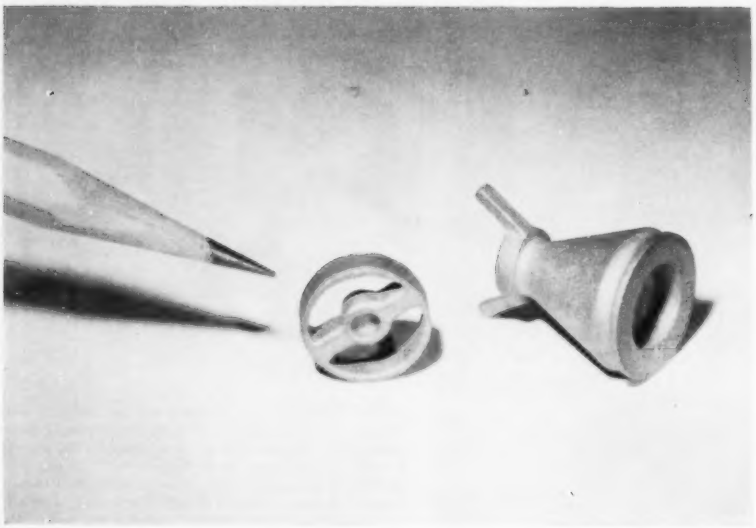
DESIGN FOR
INVESTMENT CASTINGS

Eliminates Costly Brazing and Machining



PROBLEM: Costs on this collet head and spreader for liquor dispensing equipment seemed high. The round collet head required ten costly operations to produce it, and about half the bar stock was machined away as scrap. The collet spreader was machined in three pieces which had to be brazed together.

SOLUTION: Investment cast at The International Nickel Co.'s Bayonne foundry, each part requires only lapping and drilling one hole. On both parts, a tolerance of ± .003 is held. Parts are cast in Inconel nickel-chromium alloy to protect color and flavor of liquor. Costs are cut 30% on the collet head, 15% on the spreader.

DESIGN FOR
DIE CASTINGS

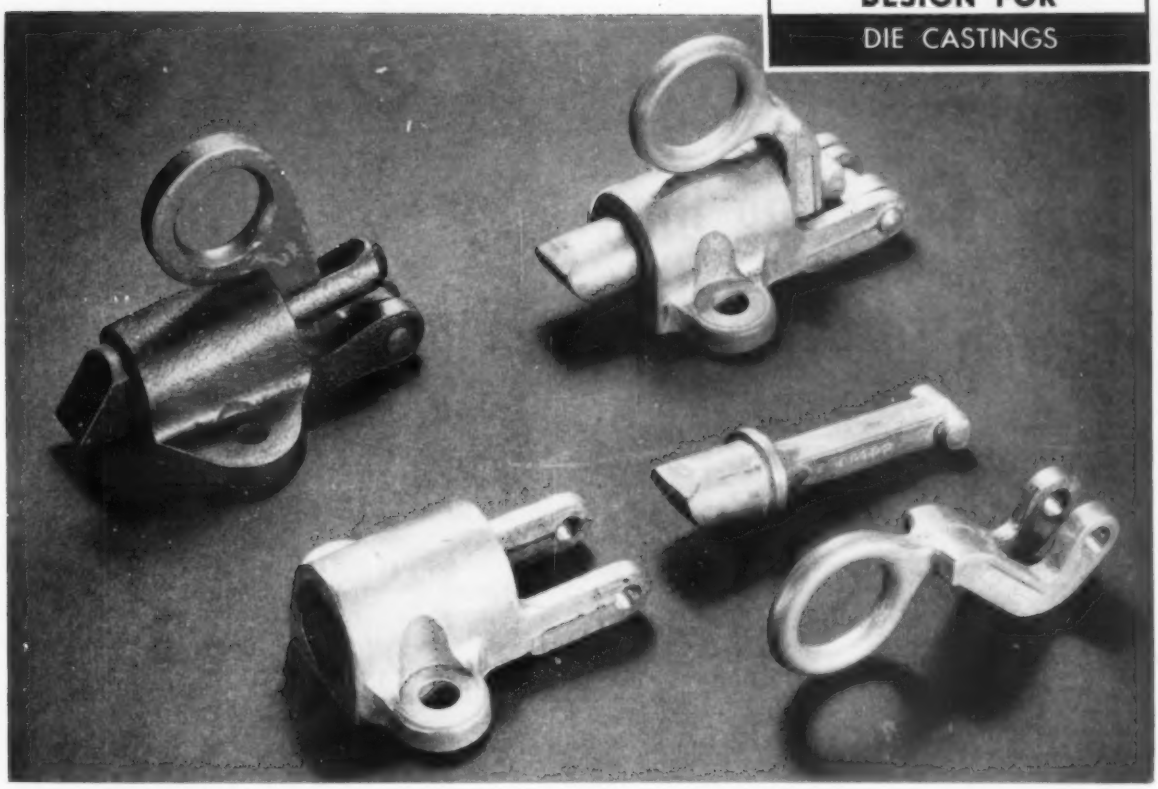
"Handsomest Handgun" Uses Die Castings

WHEN High Standard Mfg. Corp. of Hamden, Conn., set out to develop a better revolver, their demands presented many problems. The company wanted a lightweight, .22-calibre revolver, and The Newton-New Haven Co. came up with some of the answers.

Newton developed a die cast aluminum frame and trigger guard which was light and rugged. While these parts normally are forged steel, the aluminum die castings didn't sacrifice efficiency or quality. In fact, a by-product benefit gave this product the distinction of being "America's handsomest handgun."

It made possible new eye appeal in firearms creation because the aluminum frame was dura-tone-finished in gold, turquoise, or pink, as well as conventional black or nickel finish. As a result, High Standard maintained its tradition for superb handgun craftsmanship and achieved a new standard in sales strategy with added buy appeal through modern die casting and metal-finishing techniques.

DESIGN FOR
DIE CASTINGS



SAND CAST CATCH (upper left) needed machining, didn't work right. Die castings cost less, work fine.

From sand castings . . .

Redesign to Die Castings Pays Off

DOING IT YOURSELF offers a savings to the large industrial manufacturer as well as the hobbyist. The Michael-Flynn Mfg. Co. used to buy stock spring catches for the windows they made. All they did was fasten the catches to the windows. This was considered a saving because they didn't have to worry about making the catches. There was one drawback — customers complained that the catches broke or wouldn't work right.

The difficulty was that the catch, made from three sand castings, was poorly designed. When you pulled back the plunger to open a window, the plunger often stuck in the tube. Then, too, the rough appearance of the sand castings was considered undesirable. Rather than look for another shelf item to replace it, Michael-Flynn decided to design its own catch.

A three-piece zinc die cast assembly, they decided, was the best way to make it. Die casting would end the complaints about rough finish. But, more important, they could design the three parts (housing, plunger, and pull ring) so they could be used as cast. Better yet, they could be mass produced at a low cost.

They redesigned the pull ring and the plunger to prevent sticking. Instead of fitting the pull ring through a slot in the plunger, as in the old part, the pull ring was shaped to follow a radius at the end of the plunger. This allows the plunger to be pulled in the same plane as the tube it's housed in, not upward and against the tube as before. The housing was redesigned to accommodate the new operating mechanism.

Michael-Flynn now buys the three die cast parts of the catch and assembles them as cast. The only finishing necessary is to smooth the parting lines on the pull ring and plunger for smooth operation.

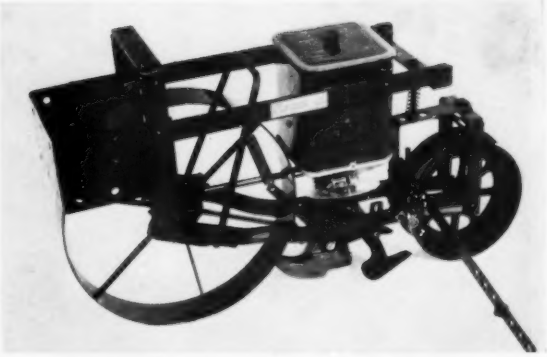
Michael-Flynn, by doing it themselves, not only got a better catch, but saved 20 to 25% of the original cost of the stock catch. The savings is attributed to the amount of machining that would be necessary to finish the sand castings.

Here's the difference:

Sand Cast Catch	Die Cast Catch
1. Face mill sides of pull ring.	NO Machining.
2. Bore the cylinder in the housing for the plunger.	
3. Deburr and smooth the finger hole on the pull ring.	
4. Drill the back hole in the housing.	

DESIGN FOR
DIE CASTINGS

Die Casting Dies on Job for 20 Years



SEEDER has changed very little in 20 years.

IT MAY NOT BE the world's first die casting, but a seed hopper bottom is certainly one of the old timers. For more than 20 years, S. L. Allen & Co., manufacturers of seeding equipment for the commercial grower, have been using this die cast hopper bottom. They still cast it in zinc in the original dies.

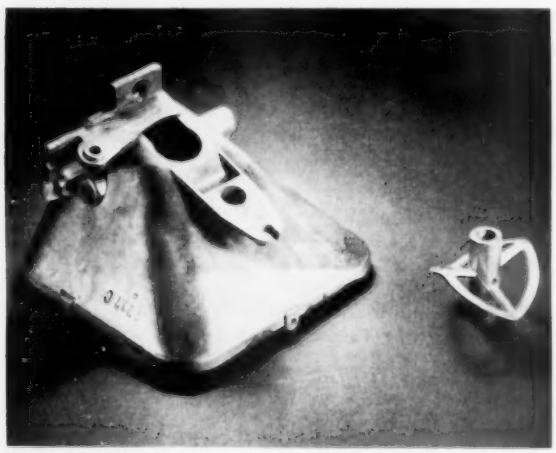
When pulled behind a tractor, this ground driven seeder firms the soil, makes the seed furrow, drops the seed, covers the seed furrow, and packs down the soil. The hopper bottom serves as a mounting for the hopper, and it contains the seed metering mechanism.

This is how the seed is dispersed: A zinc die cast feed wheel, rotated by a drive shaft connected to the front wheel of the planter, agitates the seed in the bottom of the hopper. This rotation pushes seed to the opening in the hopper bottom. A seed plate, set to the correct seed hole size, lets the right amount of seed pass through. Since only a small number of the seed can be dispersed at a time, the bulk passes by the hole into the hopper. This movement used to wear the casting, and in time, would wear a hole through it. So Allen's engineers cadmium plated the casting to provide a surface of sufficient hardness to withstand the wear.

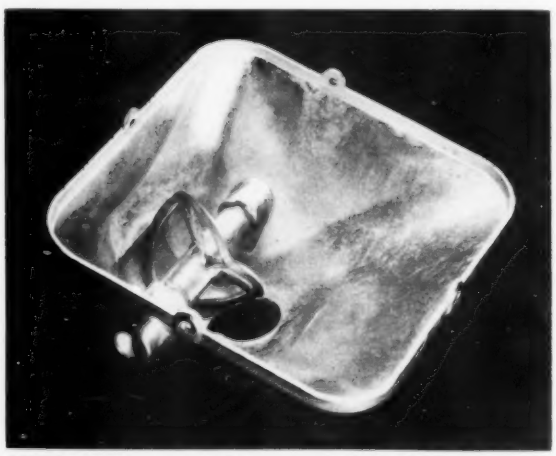
Very little machining is needed to ready the hopper bottom for assembly:

1. The 2 cored holes for the drive shaft are line reamed. This insures perfect alignment between the holes.
2. The radius where the feed wheel turns is milled. This is to make certain the distance between the wheel and the casting is 0.005″. If the spacing were too large, the seeds would be crushed. If too small, the wheel wouldn't rotate.
3. The surface where the seed plate fits against the bottom of the hopper is milled. This insures a tight fit to prevent seeds from slipping between the plate and the hopper.
4. Tap one hole.
5. After milling the bottom of the casting for the seed plate fit, the edges of the hole are sharp. This sharp edge is removed by a hand filing operation.
6. The hopper bottom is cadmium plated.

The die cast feed wheel requires only two machining operations. A hole is drilled for the cotter pin, and the two ends are face milled to +.000/—.0025″. On the wheel, there are flights that control the rate of feed. They require no machining and are used as cast. The O.D. of the flights is held to +.000/—.003″ in casting. This eliminates machining, necessary on a sand cast counterpart used on other models. Another feature of the wheel is the large openings in the flights. They make possible the handling of larger seeds.



HOPPER BOTTOM (left) and feed wheel are zinc die castings.



BOTH PARTS require only minor machining before assembly.

after 30 years of serving the die casting industry in finishing we **NOW** offer you a complete die casting service

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Take a tour of our modern plant by means of this well-illustrated booklet that shows our facilities for making and plating your die castings.

THE DISALLE PLATING & DIE CASTING CO. INC.
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I am interested in learning more about your ability to produce and finish die castings for me. Please send me your photographic booklet showing your complete facilities without obligation.

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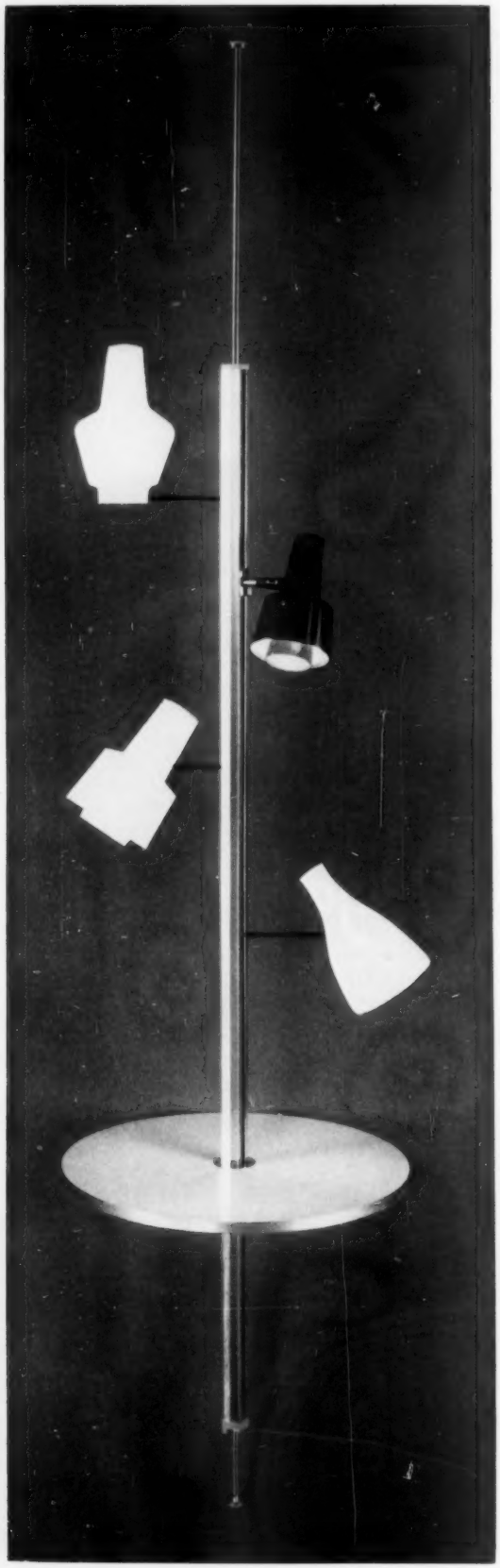


One Unique Extrusion

THE LAMP shown at the left is a design engineers' answer to a challenge to design a portable floor-to-ceiling pole lamp that:

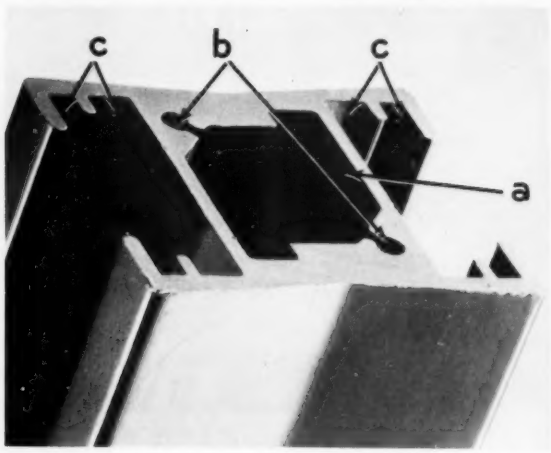
- Must be exceptionally strong, yet lightweight for easy installation and moving.
- Must be electrically safe, yet designed so that several lamps can be fastened at any point along either of 2 sides of the pole.
- Must be versatile. The lamp must fit in rooms with ceiling heights that vary from 7′-6″ to 9′-6″.
- Must compete successfully with similar lamps already on the market.

The key element in the design is the column. It's an extrusion, made in 6063-T5 aluminum by Aluminum Extrusions, Inc. Only an extrusion enabled the designer to meet all the above qualifications. Why? First, and most important, the extrusion process made possible an almost unlimited choice of cross-sections. Second, an aluminum extrusion was selected because it offered a high strength-to-weight ratio. Third, it could be attractively finished by either anodizing or enameling.

The unlimited cross-section design made three design features possible, an exclusive for this lamp manufactured by Lightolier, Inc., a major manufacturer of both consumer and commercial lighting equipment:

1. A hollow inner chamber to house the height adjustment mechanism (Figure 1a).
2. Two continuous holes in the extrusion (Figure 1b) to take the self-tapping screws that fasten on the end caps (Figure 2a).
3. Two sets of continuous double recesses on both sides of the extruded shape (Figure 1c). The inside groove (Figure 2b) on either side retains the two twin lead electrical inserts. This allows the pole to be electrified from top to bottom. The

FIGURE 1. Use of extrusions permitted a hollow inner chamber (a), two continuous holes for self-tapping screws (b), and two sets of continuous double recesses (c) to be designed in.



Provides Flexibility for Designer, Consumer

outside groove (Figure 2c) on either side nicely holds mechanical twist-and-lock coupling devices. They hold the various lighting accessories and also serve to complete the electric circuits.

This extrusion offers more than functional advantages. Besides being unique, practical, versatile and functional, the lamp had to be fashionable, or it wouldn't sell. The extrusion made a contemporary, handsome lamp. To enhance its beauty, it can be anodized to obtain a brilliant brass finish, or it can be enameled in a variety of colors.

MANUFACTURING ADVANTAGES

There are manufacturing advantages also, not the least of which is low tooling cost. The only charge is for the extrusion die. Because it was a complex hollow shape, the die ran around $600. This is low, compared with the die charges for other processes. Lightolier engineers make this point: "Extrusion dies are so inexpensive that often it is cheaper to have a die made for experimental purposes, than to have the prototype made by other means."

Close tolerances can be held. By working closely with the custom extruder, closer-than-standard tolerances can be held. For example the standard extruding tolerance on a thickness of 0.595 is ±0.009. But to insure proper functioning of the coupling device for the lamps attachments, this thickness has to be held to ±0.005.

Another example is the radius for the self-tapping screws, Figure 1b. This 0.099 diameter is held during extrusion to within +.000/—.010.

DIE CAST PLUG HOUSING

The plug housing (Figure 3) is die cast in zinc by the Seaboard Die Casting Corp. It supports the lighting fixture, and houses the clamping mechanism. Die casting was the only suitable way to make the housing since any other method would have been prohibitively expensive.

The casting has to meet certain requirements. For example, it has to have an excellent surface, one that requires a minimum of polishing for final finishing. Also, it has to be carefully trimmed. Originally, there was trouble with burrs that remained in the internal core. These interfered with the rotating nylon locking device inside. To overcome this problem, Seaboard Die Casting Corp. made a new core for the casting and, in addition, Lightolier insisted on excellent burr removal by the die caster.

The slot on the side of the housing (Figure 3a) is cast in the part. The only machining required on the housing is to punch a hole for the thumb screw to lock in, punch a dimple in the side, trim the slot, and remove burrs. The housing is plated or spray painted depending on the finish of the pole it has to match.

The nylon insert in the housing contains the electrical pickup prongs (Figure 3b) and two flanges (Figure 3c). When fastened to the pole, and locked in place, the pickup prongs lock in the electrical raceway (Figure 2b) and the two flanges lock in the outside groove of the pole (Figure 2c). This combination provides a positive electrical connection that is perfectly safe, and makes a rigid lock that holds the fixture in place. The thumb screw, when tightened down, prevents accidental turning of the nylon insert. This clamping mechanism allows a lamp to be fastened along either of two sides of the pole.

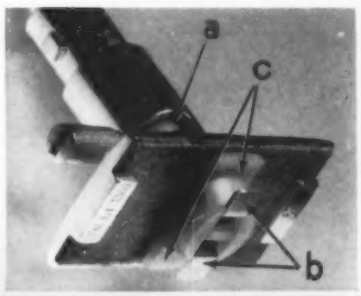


FIGURE 3 (RIGHT). Plug housing is easily attached. Prongs (b) engage the raceway; flanges (c) lock in the outside groove.

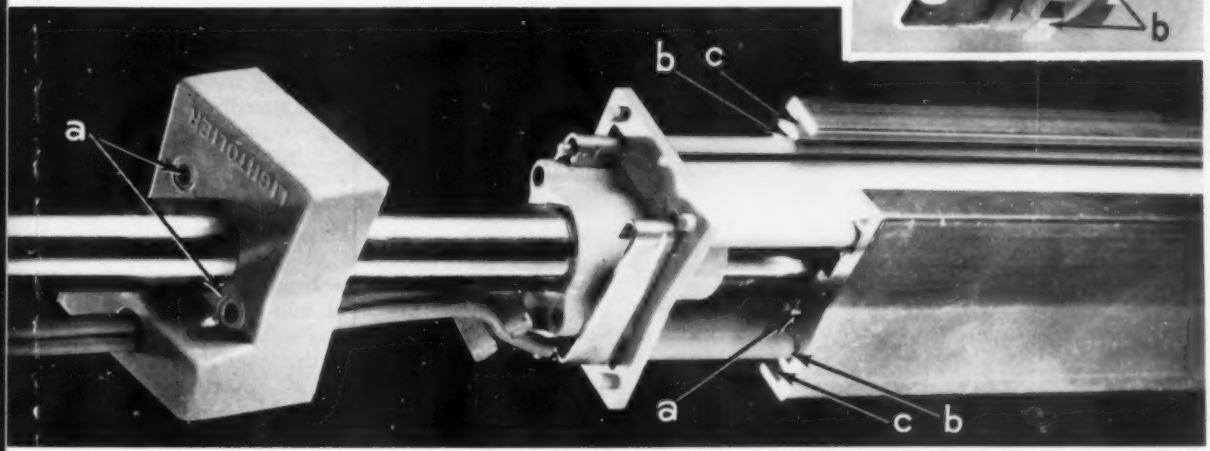


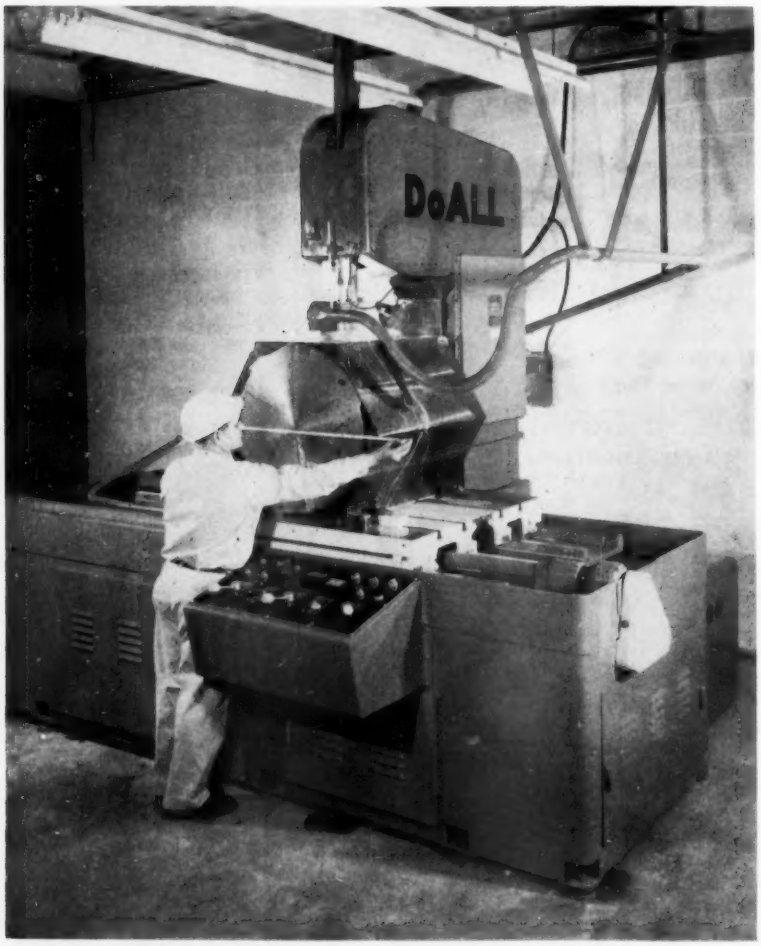
FIGURE 2 (BELOW). Easy assembly of components is illustrated in this view of the lamp, which shows the base attached.

Brush Beryllium produces . . .

World's Largest Powder Metallurgy Part

IF A BILLET weighing 2575 pounds isn't the largest powder metallurgy part ever produced, we'd like to hear about any bigger ones. Producing this gigantic beryllium billet and slicing it into 13 reactor plates instead of producing them singly kept deliveries on schedule, saved 200 hours of valuable furnace time, and saved more than $50,000 worth of material.

This out-sized job marks another breakthrough in beryllium technology by Brush Beryllium Co. The unusual has been an everyday occurrence at Brush ever since the famous Manhattan Project of World War II. Their constant research into improved methods for producing and utilizing beryllium has lowered its price so that it is rapidly finding new uses wherever great rigidity, high thermal capacity, light weight, and high melting point are required.



HUGE BILLET being cut into three parts on a band mill.

The reactor plates required were 13 hexagonal plates, 30 inches high and 1 to 2 inches thick. The plates are produced by Brush's patented QMV process, the hot pressing of high-purity beryllium to produce dense, homogenous billets with good mechanical properties.

If pressed individually, each would require a thickness allowance to remove the slightly-dished shape resulting from pressing. Additional material would have been used and additional machining allowances would be necessary for each plate.

Instead, one 2575-pound billet, 36 inches in diameter and 36 inches long, was pressed. The savings at this point was 200 hours of furnace time.

To cut the huge billet down to size, a DoALL band mill was used. After machining the cylinder into a hexagon, it was divided into three parts for trepanning the holes. The trepanned pieces were then returned to the band mill and sliced into the required 13 plates.

For this operation, a 2-inch wide, 2 pitch, DoALL Demon high-speed steel saw band was used at 130 to 140 SFM with coolant. The time per cut averaged 12 hours. It is estimated that over 1000 pounds of beryllium, at a cost exceeding $50,000, was saved by band milling the single pressed block.

Tool Steels and Heat-Treatments For Copper and Copper-base Alloy Extruding

Most brasses and bronzes are extrudable. Of the many alloys available, Muntz metal is the most popular though architectural bronze and forging brass are becoming more widely used. The higher temperatures required for extruding the red metals, when compared with aluminum, requires more careful control of heat-treatment to secure the high temperature strength required.

AISI Type	Preheat	High Heat	Quench	Temper	Brinell	Rockwell-C
DIES FOR SHAPES						
H-12	1400 F	1850 F	Air	1100 F	371/390	40/42
H-14	1400 F	1950 F	Air	1250 F	327/344	35/37
H-21	1500 F	2150 F	Oil and Air	1250 F	319/336	34/36
H-22	1500 F	2150 F	Oil and Air	1300 F	319/336	34/36
H-26	1500 F	2250 F	Oil and Air	1350 F	294/311	31/33
Rexalloy A (Inserts)*	No heat treatment necessary — Furnished about Rockwell C-40/44					
Rexalloy 33 (Inserts)**	No heat treatment necessary — Furnished about Rockwell C-54/58					
DIES FOR ROUNDS						
H-12	1400 F	1850 F	Air	1050 F	421/443	45/47
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42
H-22	1500 F	2150 F	Oil and Air	1250 F	362/381	39/41
H-26	1500 F	2250 F	Oil and Air	1300 F	362/381	39/41
Rexalloy A (Inserts)*	No heat treatment necessary — Furnished about Rockwell C-40/44					
Rexalloy 33 (Inserts)**	No heat treatment necessary — Furnished about Rockwell C-54/58					
DIES FOR TUBES						
H-12	1400 F	1850 F	Air	1050 F	421/443	45/47
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42
H-26	1500 F	2250 F	Oil and Air	1300 F	362/381	39/41
Rexalloy A (Inserts)*	No heat treatment necessary — Furnished about Rockwell C-40/44					
Rexalloy 33 (Inserts)**	No heat treatment necessary — Furnished about Rockwell C-54/58					
BACKER BLOCKS AND DIE HOLDERS						
H-12	1400 F	1850 F	Air	1100 F	371/390	40/42
H-14	1400 F	1950 F	Air	1200 F	362/381	39/41
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42
H-26	1500 F	2250 F	Oil and Air	1300 F	362/381	39/41
CUTOFF KNIVES						
H-12	1400 F	1850 F	Air	1000 F	512/543	52/54
H-21	1500 F	2150 F	Oil and Air	1100 F	496/525	51/53
EJECTOR DISCS OR PUSH-OUT RINGS						
H-12	1400 F	1850 F	Air	1100 F	371/390	40/42
EXTRUSION PRESS LINERS						
H-12	1400 F	1850 F	Air	1050 F	421/443	45/47
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42
EXTRUSION PRESS RAMS						
H-12	1400 F	1850 F	Air	1100 F	371/390	40/42
DUMMY BLOCKS						
H-12	1400 F	1850 F	Air	1100 F	371/390	40/42
H-14	1400 F	1950 F	Air	1200 F	362/381	39/41
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42
H-22	1500 F	2150 F	Oil and Air	1250 F	362/381	39/41
TUBE EXTRUSION MANDRELS						
H-11	1400 F	1800 F	Air	1100 F	400/421	43/45
H-21	1500 F	2150 F	Oil and Air	1200 F	371/390	40/42

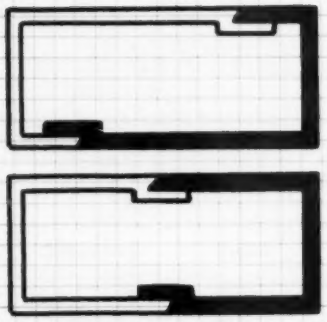
NOTE: When the diameter of mandrels exceeds 3", the hardness should be lowered to Rockwell C-39/41

Grade	Typical Composition			
	C	W	Cr	Co
*Rexalloy A	1.20	4.5	28.0	65.0
**Rexalloy 33	2.25	17.0	33.0	44.0

Data courtesy, Crucible Steel Co. of America

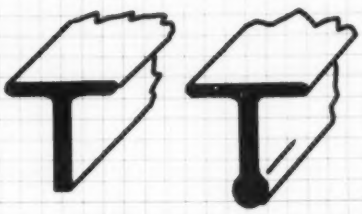
use these PMM **Design Tips** for lower costs -better products

Use these selected hints when designing extruded sections



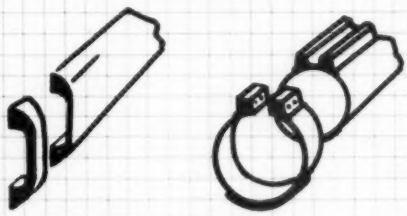
An original design (top) is for self mating extrusions. The uneven legs cause problems in the flow of metal.

Shape at left is within fabricating limits. Shape at right is easier to make.

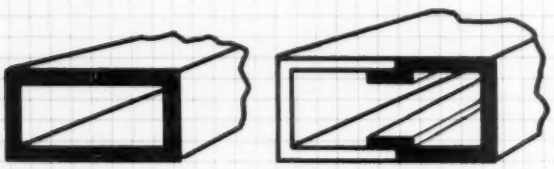


Redesign for added strength. The same basic T cross section with metal added where needed.

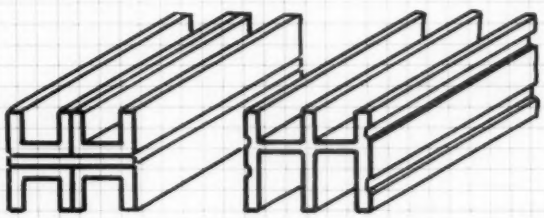
Variations are possible in the same cross section. Extrusions permit greater flexibility for the designer.



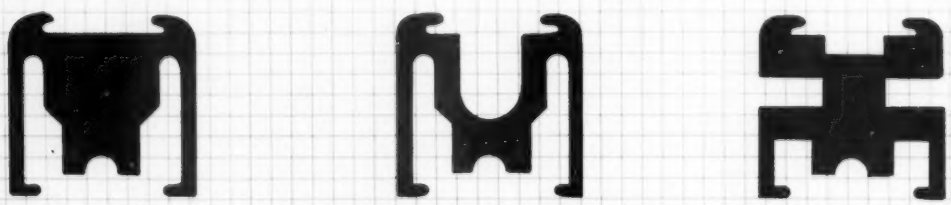
Sections cut from extruded shapes are quickly machined to finished condition.



This hollow shape (left) can be extruded. Cheaper is the assembly shown at right.



The extrusion at the right replaces four simple channels and a base part. It eliminates joining operations, permits freedom of design and improved appearance.



Original design — 1st modification — Final design

Design modifications can cut weight and give a better part at lower cost.

Courtesy Precision Extrusions, Inc.

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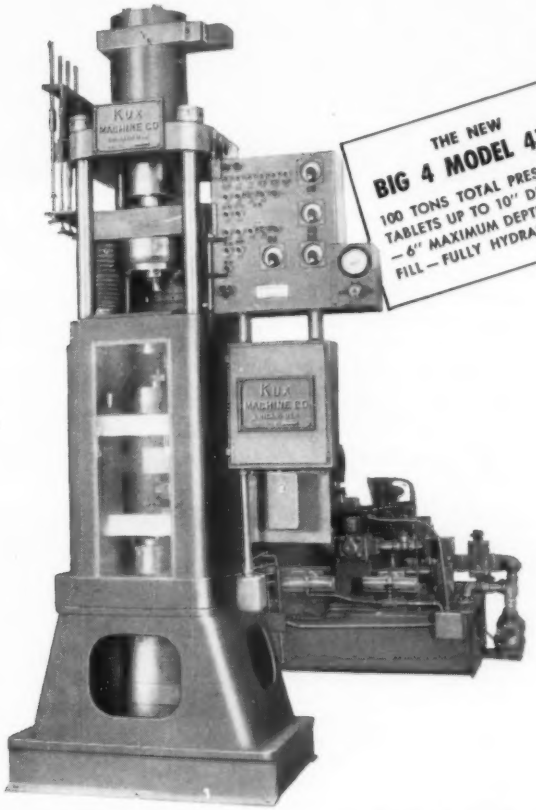

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- **Accurate Dimensional Thickness of Tablets** — upper and lower punches come to a positive mechanical stop position, holding thickness of each tablet.
- **Always True Density** — upper and lower punches can be adjusted to come to a hydraulic pressure stop position, applying exact pressure on the tablet to give true density regardless of variation in die fill.
- **Perfect Punch and Die Alignment** — combination leader-pin, ball-bearing guides keep upper punch in perfect alignment with die at all times, so that close tolerance parts can accurately be made.
- **Push Button Control of Adjustments** — for upper punch penetration into die, and the die fill allows instant and accurate change of either setting, and scales show the exact position of the punches at all times.
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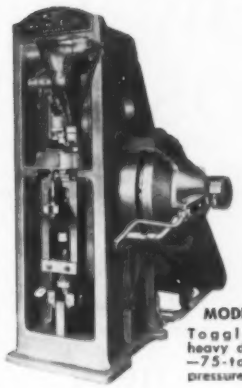
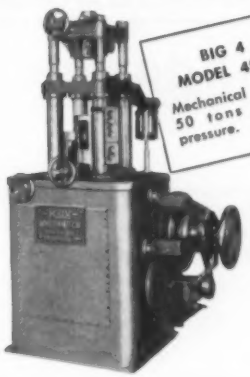
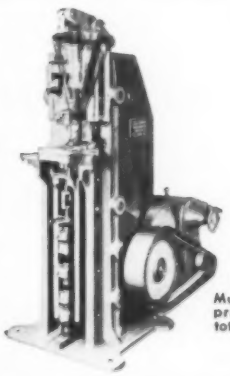


MODEL 65B
Toggle type heavy duty press —75-ton total pressure.



BIG 4
MODEL 450B
Mechanical press 50 tons total pressure.



MODEL 64
Multiple motion press — 30 tons total pressure.

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PMM

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

Finishing Section

Automatic Finishing of Zinc Die Castings

AUTOMATIC FINISHING of the die cast float bowl on a four-jet carburetor is typical of the way Rochester Products Division of General Motors geared production to meet high-volume requirements for single-jet, two-jet, and four-jet carburetors in more than 80 different models for GM cars.

This variety is required because of different specifications on several basic units, modifications due to differences in calibration, altitude control, transmission linkage controls, and the addition of governors for truck engines.

The four-jet carburetor (Figure 1), which is discussed here, requires 257 different parts. Attaining quality and performance at low cost calls for close cooperation among engineering, manufacturing, and quality control. It also requires automation.

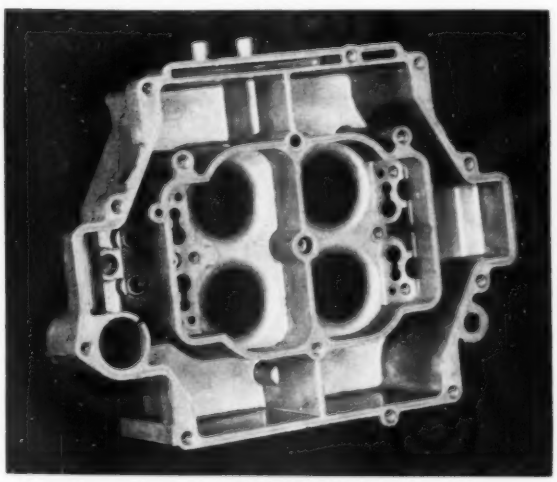


FIGURE 1.

The carburetor's float bowl is both a fuel reservoir and a housing for critical metering parts. The float bowl is die cast in zinc alloy ASTM AC41A (XXV) along with other products made at the plant (lock and key assemblies, fuel injection systems, etc.) because of its superior physical properties. The float bowl, cast in a single cavity mold on a 400-ton Reed-Prentice machine, requires complex corring and is held to close dimensional tolerances: ±0.001 on cored holes. Minimum wall thickness is 0.060 – 0.065.

The die casting machine operator degates the casting and trims the contour on a Hydro-Pierce press during the casting cycle. The castings are then pressure tested with air at 12-15 psi.

TRIMMING AND MACHINING

For machining high volume parts, RPD uses an in-line transfer type machine. The inline machine for the four-jet float bowl (Figure 2) has 101 stations and

continued on next page

FIGURE 2.

features automatic transfer between the four sections. Developed jointly by RPD and the GM Process Development Staff, this machine performs 99 machining operations, including drilling, reaming, tapping and milling; 25 probing operations to check for broken tools; 26 deburring operations. The first operation, final trimming, was later added by RPD.

Four men are stationed on the inline machine: one at the load end, two along the four sections, and one at the unload end. The castings, hand loaded into the trim press, are trimmed, then automatically fed to the first section of the inline machine. Note in Figure 3

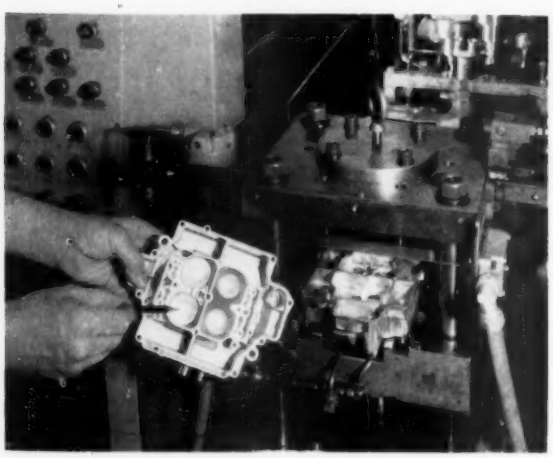


FIGURE 3.

that the four holes for the venturi openings are not cored all the way through during casting. Instead, a wafer thin piece of metal is left to be removed during trimming. The reason is simple. A sharper, cleaner trim is made than when there is just a little flash remaining.

Figure 2 is the first section of the inline machine. At this section, the first operation is to drill a hole in each of two ears which serve to locate the casting through the rest of the operations. At this station, five independent drill heads are run off one feed cylinder.

After drilling operations are completed at the first station, the castings move to the transfer mechanism between the first and second stations (Figure 4). In this transfer, each casting is rotated 90° and automatically turned upside down to permit further machining of the bottom of the castings.

At the second section, drilling, tapping, and probing operations are done. Then, on the transfer from the second to the third section, the castings are again turned over and placed in position for operations performed at the third section. The procedure is similar for the fourth section.

Extensive use is made of multiple drill heads. Some of these are conventional geared heads, others consist of a number of spindles on a slide which is operated by one hydraulic feed cylinder. As an example, one slide covers five stations and performs an operation on five parts simultaneously. The entire inline machine operates on a six-second cycle. This means that every six seconds another operation is performed on the casting.

The two men stationed along the sections are responsible for replacing broken or dull tools and changing the machine over to handle a different model float bowl. The inline machine handles 10 variations of current four-jet float bowl production and service requirements for previous models. Downtime for a model change-over can vary from a few minutes to about one hour. The longest time required is to accommodate carburetor bowls that have different barrel heights. The inline machine, in use for five years, has changes with minimum alterations.

The end station on the inline machine is the final blow-off for removal of loose chips. Here, the fourth man unloads the castings and places them on an overhead trolley conveyor.

Since the man at the unload end would be unoccupied when the machine is down, a trim press has been set up nearby where he can trim castings from another line.

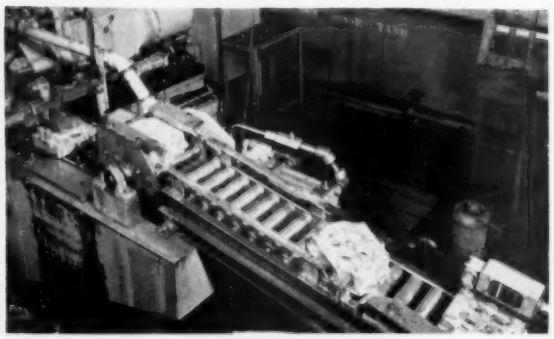


FIGURE 4.

CLEANING AND COATING

The conveyor carries the castings from the inline machine to a preliminary cleaning station. While still on the conveyor, the castings are routed through a Circo washer and rinse (Figure 5), then routed back been flexible enough to withstand yearly model

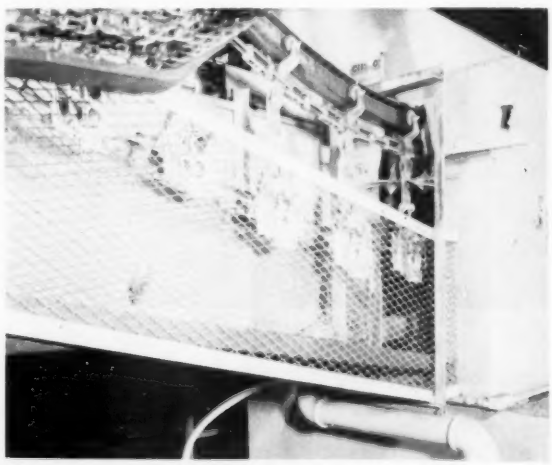


FIGURE 5.

and taken through another wash and rinse. The four-jet bowl is just one of several parts that are routed through the wash and dichromating tanks. This preliminary cleaning removes the coolant and chips remaining from the operations on the inline machine.

From the preliminary wash, the castings continue on the conveyor to the dichromating tanks (Figure 6).

FIGURE 6.

In this phase, the castings pass through a cleaning tank, a rinse, the dichromate tank, and a final rinse.

Although dichromating is normally done after deburring, RPD has several reasons for doing it before: (1) The yellow color of the dichromate makes it easier for operators to see burrs that have to be removed by hand. (2) During dichromating, dirt can be dropped in the solution by castings as they pass through. A dirty solution could clog some of the minute passageways in the castings. By deburring after dichromating, RPD is assured all critical passageways are clear. (3) To a degree, dichromating is a cleaning operation.

From the dichromating tanks to the next station, the castings are carried high overhead on the conveyor long enough to dry.

DEBURRING OPERATIONS

Some burrs are difficult to remove automatically. At the manual deburring station, two operators pick the castings off the conveyor and check the four diagonal tapped holes into which the metering jets are driven at assembly. Also, they check for loose flash. Necessary deburring is done and the castings are then placed on a belt conveyor in a vertical position.

The belt conveyor feeds the castings into a straight line deburring machine (Figure 7) which holds the castings in a fixed vertical position. Twelve critical operations are done through a combination of high pressure air blasts and deburring tools.

FIGURE 7.

RPD uses cutting tools, such as drills and reamers, for deburring in preference to other methods (barrel finishing, for example) for two reasons: (1) For a specific job, such as deburring a point where two passageways meet, the cutting tool assures that the point will be cleaned. (2) This method is not affected by the size of the burr being removed. When drilling die castings, the size of burr will vary with the sharpness of the tool, and it is uneconomical to continually change tools on the inline machine to minimize burrs.

INSPECTION, WASHING

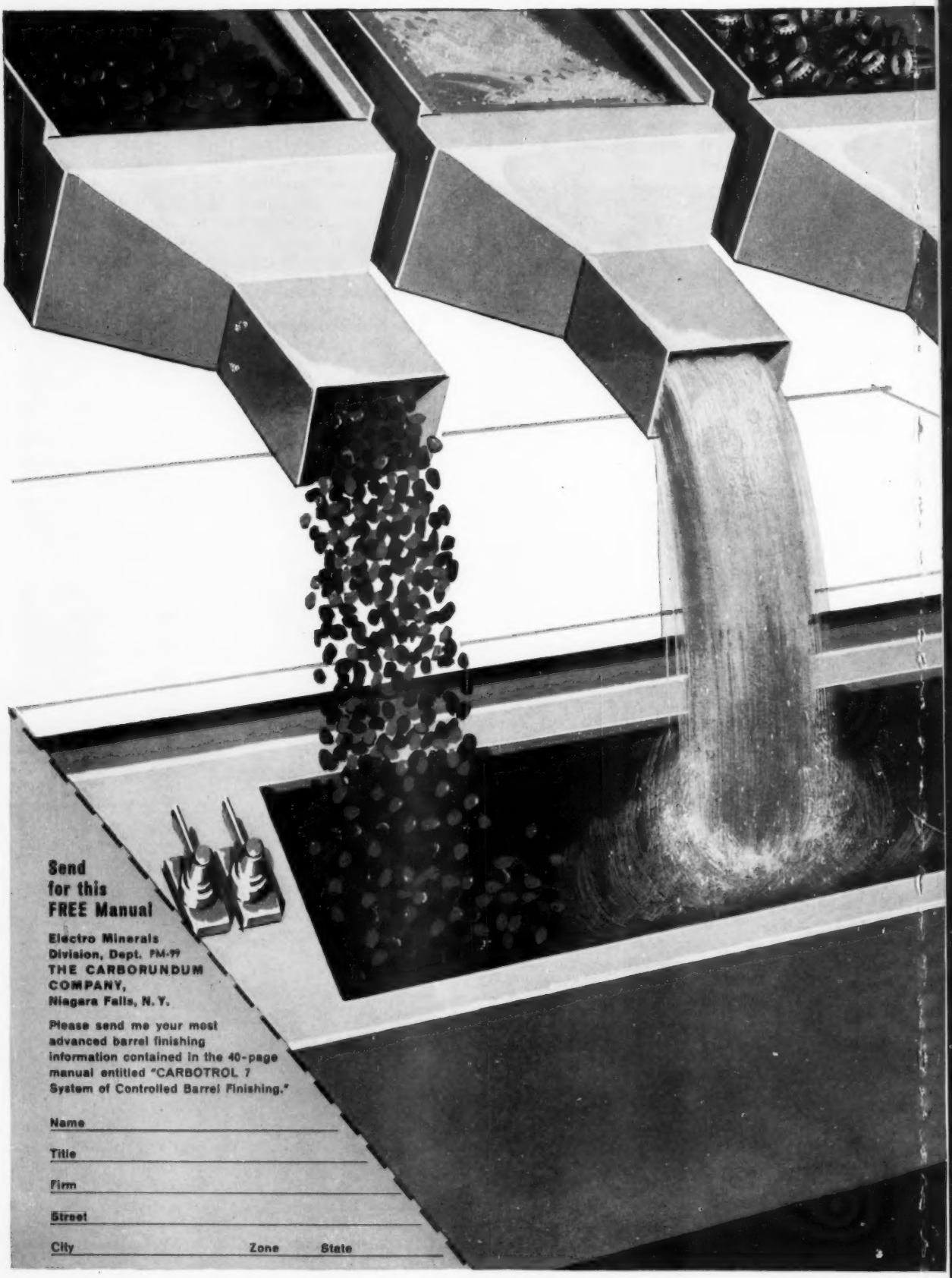
From final deburring, the castings are automatically unloaded onto a roller conveyor which carries them to the inspection machine which checks for missing holes or holes partially blocked by chips or burrs. It also finds holes that may have been drilled inadvertently.

If a casting checks out, the appropriate green lights flash, and the casting is unclamped and sent on to the next operation. Rejects are indicated by red lights on the panel. A rejected casting stops the machine and the operator has to manually unclamp the faulty part. The machine has two stations which permit the operator to load a casting while another is being inspected.

After inspection, castings are carried by roller conveyor from the inspection machine to a Centri-Spray washer (Figure 8). This is a 24-station indexing dial

FIGURE 8.

machine with fixed nozzles which direct the wash into the passageways to be cleaned. A circulating pump delivers 800 gallons of washing solution per minute at 50 psi. A room temperature washing solution is used, and no heat is required in the drying stages. One operator loads and unloads the machine. Following this operation, the castings are ready for the assembly line.



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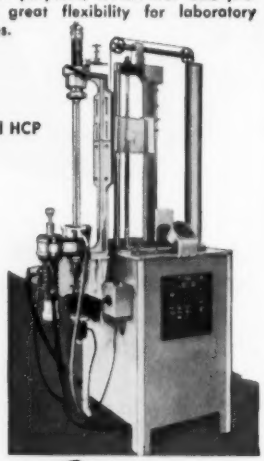
Model HCP



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- A smooth, positive mechanical drive system with continuously variable up, down and rotational speeds, all independently controlled.
- An arrangement to rapidly center the process bar within a straight walled quartz tube supported between gas-tight, water-cooled end plates. Placement of the quartz tube is rather simple and adapters can be used to accomodate larger diameter tubes for larger process bars.
- Continuous water cooling for the outside of the quartz tube during operation.
- Assembly and dis-assembly of this system including removal of the completed process bar is simple and rapid.

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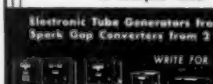

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Inexpensive Gadget

Cuts Painting Rejects

A LITTLE INGENUITY and some scrap plywood have eliminated rejects and cut costs in finishing stapler parts at the Bostitch plant in East Greenwich, R. I.

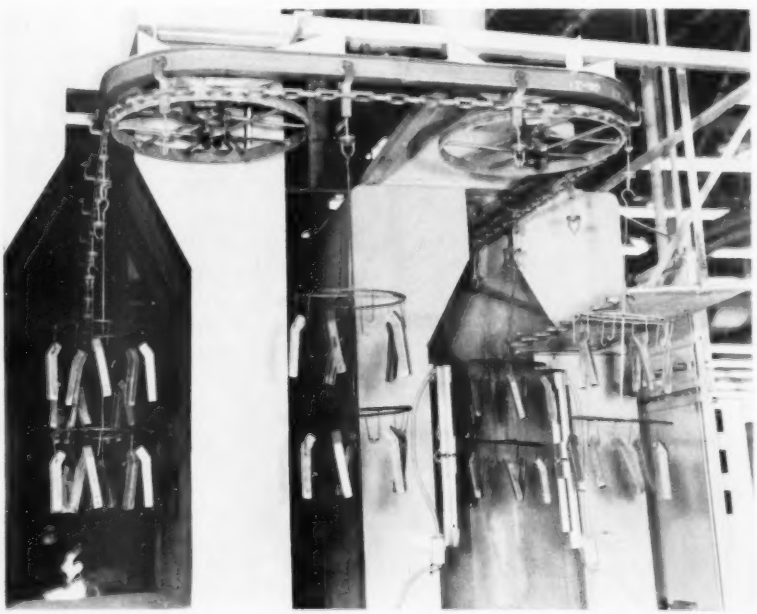
The problem was that chemical solutions were being trapped in the recesses of parts as they traveled through the automatic Bonderiter unit before spray-painting. The dry-off oven just couldn't evaporate off all the liquid in the pockets as the parts moved through, rotating slowly on their conveyor hangers.

As a result, when these parts passed through the paint line, nearly two-thirds of them had to be rejected because of water spots.

The answer, of course, was to get rid of the water. A preliminary solution was to station an operator at the exit of the Bonderiter unit to shake the conveyor fixtures manually.

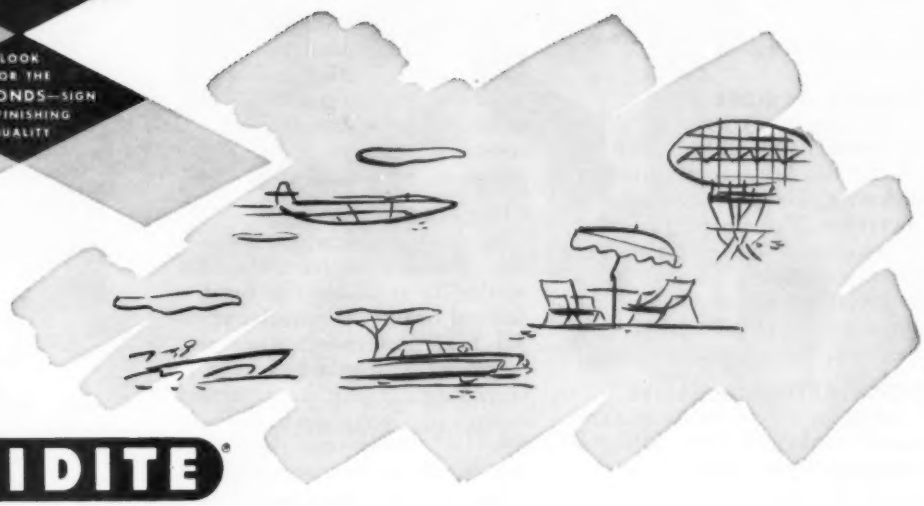
The final solution was to cut a saw-tooth edge on a piece of ½-inch plywood and mount it at the exit end of the unit. Now, as the hangers emerge, they are jogged by the saw teeth and set turning automatically, spinning off the excess liquid.

Since the installation of the board a year and a half ago, there have been no rejects because of chemical stains on painted surfaces.



SAW-TOOTH BOARD (extreme right) starts conveyor hangers turning, spinning off excess liquid before parts swing around into dry-off oven. Although the parts shown here are stampings, the idea can be applied equally well to castings.

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY



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Process Engineered

Chromate Conversion Coatings

Give you 5 additional benefits for Corrosion Protection—Paint Base—Decorative Finishing

1 A COMPLETE PROCESS ENGINEERED LINE

Developed for specific applications, there is an Iridite to provide the finish you desire, fit the equipment you have available and give the performance you require. Most Iridite coatings meet rigid military and civilian specifications.

2 EXPERIENCED TECHNICAL SERVICE

Our large field engineering staff is thoroughly familiar with chromate conversion coatings and related finishing operations. They'll help you check every step in your finishing operation to make sure you're getting the best possible finish on your products.

3 PRODUCT AVAILABILITY

Warehouses located in strategic industrial areas enable us to provide you with fast, economical delivery on any Iridite.

4 ECONOMY

The superior performance of Iridite provides low final cost by extending operating life and lowering maintenance costs. In addition, Iridite gives you a finish that adds considerably to the value of your product. There's an Iridite to meet every cost and performance requirement.

5 RESEARCH AND DEVELOPMENT FACILITIES

If you have an unusual application, we will gladly work with you. Our entire staff of experienced engineers and chemists, and our completely equipped facilities are at your service.

IRIDITE—a specialized line of chromate conversion coatings for non-ferrous metals. Apply by dip, brush or spray methods — at room temperature — manually or with automatic equipment. Forms a thin film which becomes an integral part of the metal. Cannot chip, flake or peel. No special equipment, exhaust systems or specially trained personnel required.

If you are using chromate conversion coatings to finish zinc, cadmium, aluminum, magnesium, silver, copper, brass or bronze — consider the above benefits of Iridite. For complete information, contact your Allied Field Engineer. He's listed under "Plating Supplies" in the yellow pages. Or, write for FREE TECHNICAL DATA FILE.

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IRIDITE® Chromate Coatings | IRILAC™ Clear Coatings | ISOBRITE® Plating Brighteners | ARP® Chemicals & Supplies | WAGNER Line of Equipment

Circle No. 62 on Reader Service Card

continued from page 22

TURBINE GRINDER

NEWAGE INDUSTRIES, INC. — The Desoutter 70,000 RPM turbine '03' grinder can be used for grinding, deburring, cutting, polishing and engraving. The unit runs cool, blows chips away from work and features automatic air shut off. It is specially designed for tool and die makers for intricate hand work.

Circle No. 239 on Reader Service Card

WET BLASTING ABRASIVE

TECHLINE DIV., WHEELABRATOR CORP. — Liquasheen, an abrasive consisting of glass beads, uniformly round, has good cleaning properties and features low metal removal. It can be used in wet blasting of zinc die castings, aluminum, nickel silver, steel and other metals prior to cleaning and in general cleaning to remove fluxes, discoloration, and corrosion.

Circle No. 240 on Reader Service Card

CHROMATE COATING

AMCHEM PRODUCTS, INC. — Alodine 1200S is a amphorus chromate coating for aluminum that features uniform quality. It provides up to 50% faster processing, more uniformity of coating, a higher grade of coating. It can be processed through continuous dip in the same time cycle other conversion coatings require for continuous spray.

Circle No. 241 on Reader Service Card

Scores Greatest Popularity Gain in Finishing Metals!

SPIN-FINISH is only two years old, but is already an accepted method for finishing intricate design automotive, building, appliance and plumbing hardware. This revolutionary process produces in quantity surfaces and lustre equal to or surpassing that of buffing. Spin-Finish is a completely dry process. It is dust and fume free, and requires no set-up time!

Call on the free help of Grav-i-Flo engineers for savings in your finishing operation!

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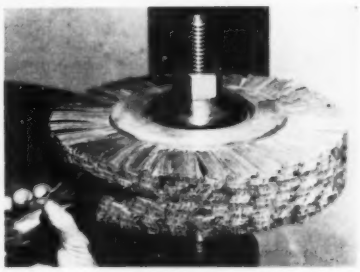
Circle No. 64 on Reader Service Card

AUTOMATIC CASTER

STAHL SPECIALTY CO. — An automatic permanent mold casting machine for aluminum alloys. It's portable in that both machines can be moved as a unit to different furnaces for different alloys. Features include an automatic timer, less die maintenance, and fast die changes.

Circle No. 242 on Reader Service Card

FLEXIBLE GRINDING WHEEL



MERIT PRODUCTS, INC. — Grind-O-Flex is a flexible grinding wheel for cleaning and polishing contoured metal parts. The wheel is said to be ideal for satin finishing aluminum. Wheel sizes are 14" and 16" diameter, widths are 3" to 60". Grits from ₵50 to ₵320 aluminum-oxide cloth are available.

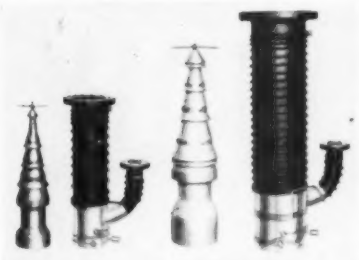
Circle No. 243 on Reader Service Card

ELECTROSTATIC PAINTING

IONIC ELECTROSTATIC CORP. — A new electrostatic paint system that reduces paint consumption and allows blending of solid single color coating materials to produce multicolor effects. The system uses an array of variable speed, centrifugal atomizers charged at a potential of 140,000 volts. Articles to be coated are oppositely charged. A conveyor transports the parts around the vertically reciprocating atomizers.

Circle No. 244 on Reader Service Card

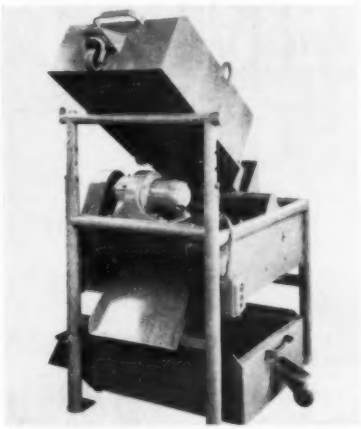
OIL DIFFUSION PUMP



KINNEY MFG. DIV., NEW YORK AIR BRAKE CO. — Advance design nonfractionating oil diffusion pumps have been announced. The series includes 1", 3", 4", 6" and 10" models. All models have high pumping speeds in the range of 10^{-2} to 10^{-5} mm Hg.

Circle No. 245 on Reader Service Card

MAGNETIC SEPARATOR



TECHLINE DIV., WHEELABRATOR CORP. — Model No. 3550 is a compact, low-cost magnetic separator for separating ferrous parts from media. The unit is ideal for situations where the size of the part, or holes and recessed areas in the part, make impossible the selection of media that would permit mechanical separation.

Circle No. 246 on Reader Service Card

VACUUM GAUGE

CENTRAL SCIENTIFIC CO. — A direct reading gage for continuous measurements of gas pressures in a vacuum system. Called the Cenco Thermocouple Vacuum Gage, the instrument is self-regulating, and will measure total gas pressures in the range of from .001 to 1 mm. of mercury.

Circle No. 247 on Reader Service Card

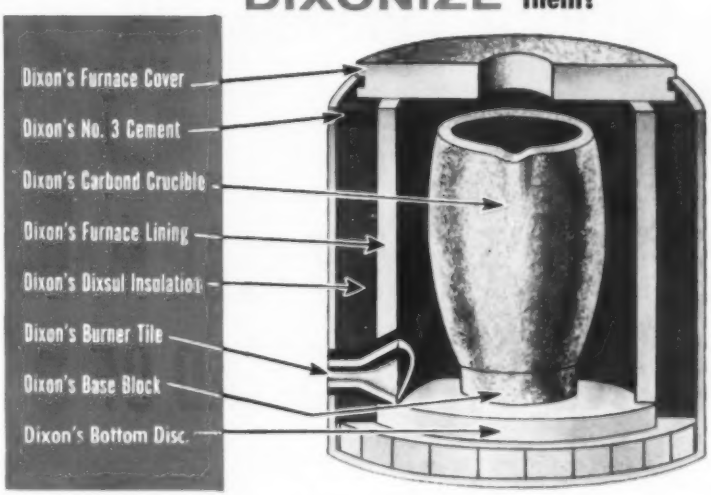
continued

BEST By TEST

When maximum tonnage at lowest cost is a "must"... there is NO SUBSTITUTE for CRUCIBLE MELTING!

Here's how to get the MOST from YOUR crucible furnaces:

DIXONIZE them!



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DIXONIZE

- **OVER 130 YEARS** of manufacturing experience combined with continuous research and field testing stands behind **every** Dixon refractory product . . . your guarantee of maximum performance at lowest cost.
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SELLERS OF

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SPECIAL HIGH GRADE 99.995% +
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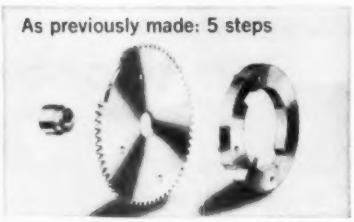
APPLIANCE TIMER GEAR MADE IN ONE STEP INSTEAD OF 5

Shown actual size

with tiny GRC zinc die casting

This mutilated gear, cam and bushing combination for an electrical appliance timer formerly required two stampings, a screw machined part and two assemblies. Die cast by GRC in one automatic operation **reduced** costs 66%, and made a **superior** product. Closer tolerances and greater uniformity were achieved by casting in one piece. Units were ready to use as cast, with no secondary operations, no scrap loss. Another demonstration of the production economies and wide design latitude Gries' exclusive methods have made possible. Only the GRC Method gives such complete design freedom for small precision parts.

No Minimum Size!
Maximum Sizes: 1¾" long, ½ oz.



See us at the Metals Show — BOOTH #1019
Write today for fact-filled bulletin. Send prints for quotation.
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GRIES GRC

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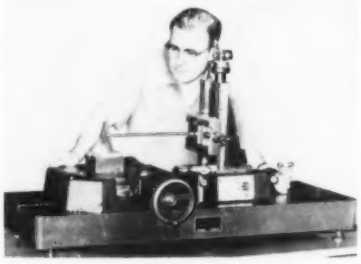
NEW PRODUCTS *continued*

MEDIA CLASSIFIER

ALMCO-QUEEN PRODUCTS DIV., KING-SEELEY CORP. — This portable automatic barrel finishing media classifier can re-size three grades of media at rates up to 6,000 lbs. per hour. Interchangeable screens are available for classifying a complete range of media sizes.

Circle No. 248 on Reader Service Card

CONTOUR MEASURING INSTRUMENT



TURBOTRONICS CORP. — The Model Sp-2 Contour-O-Scope will give fast, accurate dimensional checks of contours on parts up to 30" in diameter and 10" in width. The piece to be checked is mounted accurately on a rotary table and is measured with a universal probe that can handle 98% of parts that require checking. Movements are graduated in 0.001". Moment of contact is indicated by signals.

Circle No. 249 on Reader Service Card

RUST PREVENTATIVE

AMERICAN CHARCOAL CO. — Charcoal #1720 is a rust preventative corrosion inhibitor for protecting outdoor uncovered metal items such as die casting and trim dies. Metals coated with the film can survive up to three years storage. The film is easily removed with any cleaning solvent.

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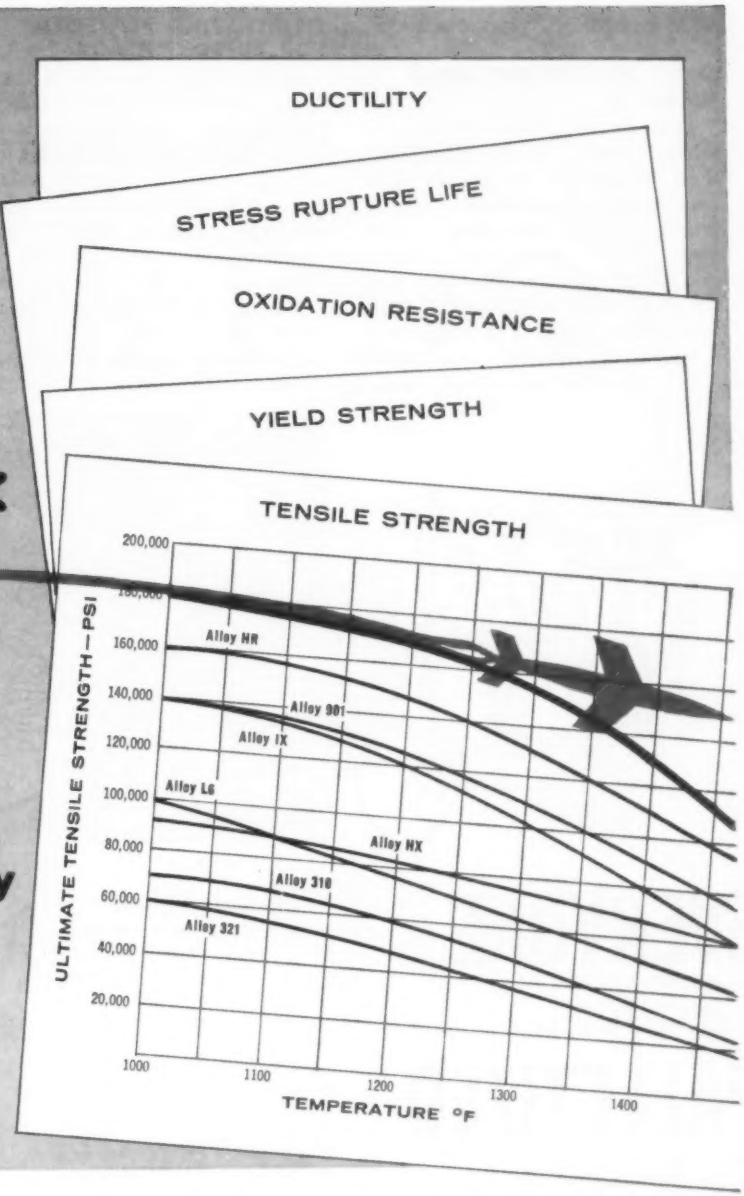
continued

HIGH

on every chart:

RENÉ 41*

most dependable alloy in use today in the 1200°- 1800° F range



In *all* ways, René 41 is a remarkable alloy. No other high-temperature alloy used in production today equals its tensile strength. In other properties, too, René 41 is far ahead of the field.

Also important, this nickel-base, vacuum-melted alloy is easy to work with. It's readily formable by drawing, bending, spinning — welds to similar or dissimilar materials.

Cannon-Muskegon offers René 41 in standard 36″x 96″ sheets .015″ to .125″ thick, in smaller sizes down to .010″, in bar stock up to 3″ in diameter . . . foil down to .001 in thickness . . . and fine wire only .0015 in diameter.

For complete details, write for Technical bulletin No. 86.

*TM of General Electric Co.

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VACUUM ALLOYS

CANNON-MUSKEGON CORPORATION

2871 Lincoln Avenue • Muskegon, Michigan

METALLURGICAL SPECIALISTS

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SHELL INVESTMENT MOLD FURNACE

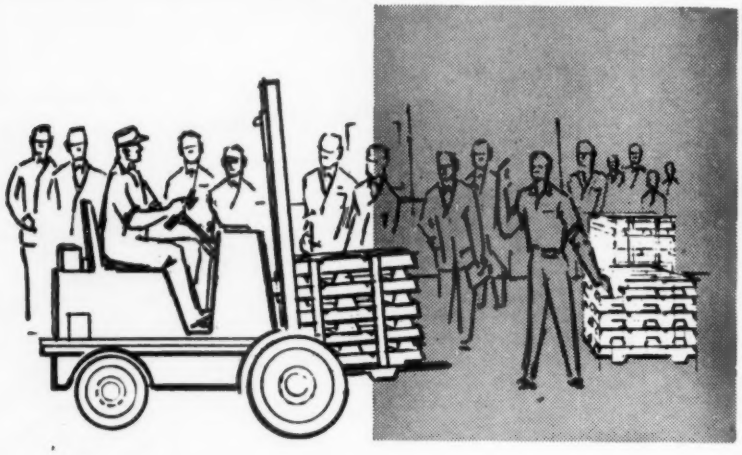
ALEXANDER SAUNDERS & CO. — Specially designed for high firing shell investment molds, the furnace features: gas-fired atmospheric burners with indicating pyrometer; 1800°F temperature; alloy grid hearth; trap-door bottom; water filled pot to collect molten wax; and counter weights on all doors.

Circle No. 251 on Reader Service Card

OSCILLATING PLATFORM FOR BUFFING HEADS

MURRAY-WAY CORP. — An oscillating platform has been developed for polishing and buffing heads that require oscillation. The platform is sturdily built and mounted on heavy lateral bearing rails which hold the head in alignment. All that's necessary is to bolt your polishing head to the platform. Units are available for heads weighing up to 3000 pounds.

Circle No. 252 on Reader Service Card



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See what a difference HB&S service . . . HB&S quality make in better casting results . . . lower costs.

Smelters and refiners of aluminum, bronze, brass, zinc, lead. Distributors of Olin Prime Aluminum.

Write NOW for this FREE reference book and guide to help you in selecting your die castings alloys. It's loaded with FACTS.

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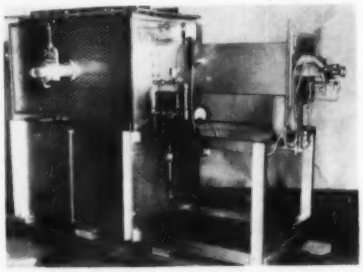
3400° F HIGH TEMP. FURNACE



W. P. KEITH CO. — This molybdenum heated furnace permits temperatures of 3400° F. in a hydrogen atmosphere. Heating is controlled by a saturable reactor and radiation pyrometer controls. Cooling is controlled by refractory lined water cooled zones.

Circle No. 253 on Reador Service Card

ELECTROPLATER'S MICROSCOPE

BAUSCH & LOMB OPTICAL CO. — This microscope is designed to provide rapid, accurate measurements of plating thickness. Features include a Filar Micrometer eyepiece, a fine adjustment knob for rapid, accurate measurements, and low cost.

Circle No. 254 on Reader Service Card

ZINC ANODES

ALLIED RESEARCH PRODUCTS, INC. — A new type of anode for zinc plating. Called the "Roll-Top" anode, it is cast in a modified oval form. The shape provides 20% more surface area than standard ball anodes, yet allows the anode to roll easily into a curved hanger basket or backfeed chute for automatics.

Circle No. 255 on Reader Service Card

continued

What's more important to you

QDP or PDQ?*

Whirlpool Corporation reports: among 598, 265 components supplied by Amplex the first 4 months of 1959, there were only 5 rejects!

Quality, Delivery, Price...
this Amplex philosophy enables our customers to cut their production and warranty costs.

The "Price" vendor with poor quality will increase your costs.

Amplex prices are low but cost-saving quality always comes first. A quality record of 99.999992% is the reason why Whirlpool Corporation says, "Quality is our business, too. That's why we purchase components from Amplex."

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* *Quality-Delivery-Price vs. Price-Delivery-Quality*

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PRECISION PARTS • SELF-LUBRICATING BEARINGS • METAL FILTERS • FRICTION UNITS

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THE PIERCE-WALLER

AIR-LUBE SYSTEM

CUTS COSTS for DIE-CASTERS

• CLEANS
• LUBRICATES

Remove loose flash and clean the mold with a powerful, clean air blast — then lubricate all mold surfaces evenly, *using the same gun* —with a flick of the thumb! Adjustment *at the gun* for full range from zero to a heavy mist, spraying, fogging, or vaporizing the lubricant. Speeds up mold operation and reduces casting rejects. Makes every machine cycle count.

USED IN LARGE AND SMALL SHOPS EVERYWHERE!

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Plant: RAJAK MFG. CO.
Specialists in polyester impregnation of metals
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NEW PRODUCTS *continued*

COVER FOR VAPOR DEGREASERS

BARON INDUSTRIES — Baron Econ-O-Lid is a new roll-type cover for vapor degreasing machines. It is designed to cut solvent losses due to evaporation from 30-60%. The cover easily attaches to all make and size vapor spray degreasers.

Circle No. 256 on Reader Service Card

POWER SAW

THE DOALL CO. — A new line of cut-off machines, the Model C-67 and C-68. The C-67 is manually fed and has a capacity of 12″ x 16″. The C-68 is a 12″ x 12″ capacity machine with fully automatic stock indexing. Features include high speed steel saw band, greater accuracy, operator convenience and high production rates.

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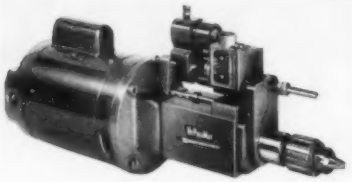
AUTOMATIC DRILLING UNITS



HYPNEUMAT, INC. — Two new compact, drilling and tapping units have been announced. Both have a 2″ stroke; ¼″ steel drill and tap capacity; ½ h.p. motor capacity; 2.35 sq. in. air or hydraulic pressure; spindle thrust; 8,000 RPM maximum spindle speed. Model S-200 EHB is the standard unit, belt driven. Model M-200 EHB is motorized.

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You can benefit by Milwaukee's 50 Years' Service to Industry

50th ANNIVERSARY 1909-1959

Since 1909, it has been the privilege of the Milwaukee Die Casting Company to work with manufacturers of a wide variety of products . . . from mechanical pencils to airplanes . . . in applying the die casting process to their problems of parts design and production. In those 50 years, Milwaukee has pioneered many of the developments which have since become standard practice.

If you wish to benefit by our 50 years of continuous service to industry coupled with the advantages of our modern die casting plant, we invite your inquiries.

Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

MILWAUKEE DIE CASTING COMPANY
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Established 1909

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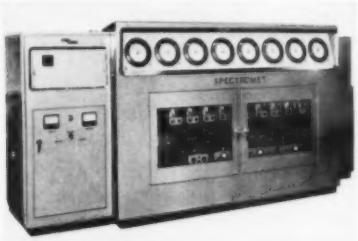
DIRECT READING SPECTROMETERS



BAIRD-ATOMIC, INC. — The Baird-Atomic Spectromet has been re-engineered to allow a greater number of elements to be analyzed at one time. The chemical composition of metal samples can be determined in less than one minute. The results are presented directly in percent concentration on the indicator dials. No special laboratory is required with the unit.

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NAMEPLATES

ALLIED DECALS INC. — Anodized aluminum nameplates, custom-made in all designs, sizes, shapes, and in one or more colors. The plates can be applied to any metal in seconds. Choice of adhesives for permanent application: press-on; and heat or solvent activated. The plates resistant to extreme temperatures and organic solvents.

Circle No. 260 on Reader Service Card

INDICATING RECORDERS

THERMO ELECTRIC CO., INC. — Thermo Electronic indicating recorders and indicating recording controllers have been introduced, which indicate, record and/or control any process variable convertible to voltage or resistance change. Instrument accuracy is guaranteed to ±0.125% of scale or 5 microvolts. Sensitivity is ±0.125%.

Circle No. 261 on Reader Service Card

DEGREASER

MANUFACTURERS PROCESSING CO. — Manpro Vibra Degreasers that feature speed, solvent economy, and thorough cleaning through the modern vibration principle have been introduced. Work can be fed manually or automatically. The unit automatically cleans and degreases small die castings on a high volume basis.

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shotgun shot

BADLY FORMED AND MIXED IN SIZE, WOULDN'T WORK WELL IN GUNNING.

ALUMINUM SHOT

BADLY FORMED AND MIXED IN SIZE, WOULDN'T DO THE JOB IN ALUMINUM ADDDITIONS TO ZINC.

GENERAL'S ALLOYING SHOT

is produced to assure round, solid uniformity with no "pop-corn". Firm and equal sized, General's **bright and shiny** shot goes rapidly into solution . . . avoids wasteful skim.

GENERAL'S ALLOYING SHOT also available, custom made to exacting specifications.

Details on request.

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USEFUL LITERATURE, CATALOGS, MANUALS

Qualified readers may obtain any of these technical publications by circling the numbers on the Reader Service Cards facing Page 80

PROCESSES

145 Sinterings—BURGESS-NORTON MFG. CO.—4-page brochure on the process, physical characteristics, mechanical properties, economies.

146 Casting Aluminum — REYNOLDS METALS CO. — 32-page technical booklet on processes for casting aluminum: Permanent Mold, Die Casting, Plaster Mold, Investment Casting. Includes design, tabular data.

147 Die Castings — DUANE SPECIALTIES, LTD. — Brochure lists company's facilities. Gives mechanical and physical properties of zinc die casting alloys.

148 Plaster Mold Castings — GORHAM MFG. CO. — Brochure shows company's facilities for precision casting by the plaster mold process.

MATERIALS & EQUIPMENT

149 Lubricants — GRAFO COLLOIDS CORP. — Bulletin on colloidal graphite dispersions for extrusion and die casting applications.

150 Brush Maintenance — NATIONAL CARBON CO. — 16-page technical manual on brush maintenance for low voltage generators used in electrolytic processes.

151 High Vacuum Equipment — KINNEY MFG. DIV. THE NEW YORK AIR BRAKE CO.—8-page report on what is new in the use of vacuum metal degassers, and other high vacuum equipment.

152 Air Motors — THE BELLOWS CO. — 16-page brochure gives production ideas on air motors and other "controlled-air-power" work units for cutting costs, increasing productivity.

153 Structural Aluminum—ALUMINUM CO. OF AMERICA — 420-page Alcoa Structural Handbook on aluminum. This new edition contains up-dated tables and extensive data on aluminum-magnesium alloys, and welded structure design.

Air Compressors—THE DEVILBISS CO.—The 1959-60 400-page service manual on air compressors and spray equipment. The manual is priced at $2.50 F.O.B. Toledo; $2.80 F.O.B. West Coast shipping points. Write on your letterhead to The DeVilbiss Co., Toledo 1, Ohio.

154 Heat Treating — IPSEN INDUSTRIES, INC. — 6-page technical bulletin on "The Facts on The New Ipsen Heat Treating Units".

155 Heat Treating Steel — UDDEHOLM CO. OF AMERICA, INC. — 28-page technical book on the modern principles of the heat treatment of steel.

156 Ejector Sleeves—DETROIT MOLD ENGINEERING CO.—Vol. 17 No. 5 of the DME News gives specs on standard ejector sleeves for die casting dies.

157 Piston Rings — THE AUTO-DIESEL PISTON RING CO. — Complete specifications on piston rings for die casting machines.

158 Stainless Tubing—BABCOCK & WILCOX CO.—Specification sheets on the high temperature applications of extruded and other tubular products in Croloy 25-20 (TP310).

159 4-Way Air Valves—HANNIFIN CORP.—4-page technical bulletin on Alternate Bases and integral speed control for Series "C" 4-way directional air control valves.

Circular Slide Rule — GENERAL INDUSTRIAL CO.—A circular slide rule, ideal for performing simple calculations in multiplication, division and proportion, is available to engineers and executives. Write on your letterhead to the company at 1788J Montrose Ave., Chicago 13, Ill.

160 Metal Powders — VANADIUM-ALLOYS STEEL CO.—8-page technical brochure on prealloyed metal powders and tool steels used in powder metal parts production.

161 High Strength Steels — UNIVERSAL-CYCLOPS STEEL CORP. — 32-page technical data brochure covers Unimach I and Unimach II high strength, high temperature steels for critical structural uses.

162 Vacuum Equipment Summary — NRC EQUIPMENT CORP.—16-page product summary of vacuum equipment and components.

163 Solenoid Valve — FLUID REGULATORS CORP. — Data Sheet FR 108 describes a no-leak two way pilot operated solenoid valve for use in 3000 psi systems.

164 Mechanical Packings—JOHNS-MANVILLE—64-page catalog lists packing style and media that the particular packing will best serve against.

165 Micrometers—TESTING MACHINES, INC.—Three brochures on precision motorized and manually operated dead weight micrometers.

166 Melting Furnace — U.S. SMELTING FURNACE CO. — 8-page brochure gives specs on the Sklenar reverberatory melting furnace for iron, ferro-manganese, copper, brass, aluminum and other alloys.

167 Thermocouples — LEEDS & NORTHRUP CO. — 52-page catalog gives complete data on a full line of thermocouples, components and accessories.

FINISHING

168 Cleaning Handbook—MAGNUS CHEMICAL CO.—32-page handbook gives over 100 types of equipment and techniques for the cleaning and preparation of metal surfaces.

169 Polishing Solution — MACDERMID INC. — Technical data sheet on Metex Electropolish BC, an acidic solution for producing a brilliant finish on copper, copper plate or brass.

170 Stainless Steel Fasteners — ANTI-CORROSIVE METAL PRODUCTS CO., INC. — 178-page catalog on stainless steel and nylon fasteners.

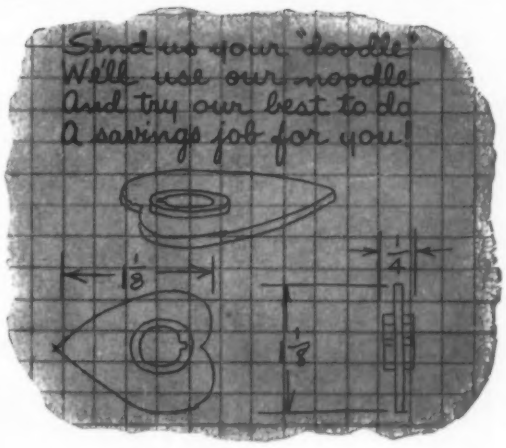
continued

Powder metallurgy cuts parts costs up to 75% for manufacturers of products like these

Why not find out now if powder metallurgy holds the answer to your high parts costs?

Send Glidden a sketch of any part, plus the quantity desired. Glidden, with the help of qualified parts fabricators in your area, will determine, first, whether the part can be made with metal powder. If it can, you will receive cost quotations that may show really worthwhile savings—similar to savings realized by an increasing number of manufacturers who have found that metal powder parts can be mass-produced faster, better, more economically.

As a leading supplier of metal powders, Glidden works closely with parts producers. In this way, several staffs of experienced technicians may be at your disposal—to provide complete technical service and suggest possible design changes that may bring even lower parts costs.



QUALITY Glidden PRODUCTS

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The Glidden Company
Chemicals—Pigments—Metals Division
Hammond, Indiana

COPPER POWDER • LEAD POWDER • TIN POWDER • BRASS POWDER • ALLOY POWDER • FILTER POWDER
CUPRIC OXIDE • CUPROUS SULFIDE • CUBOND COPPER BRAZING PASTE • COPPER PIGMENT

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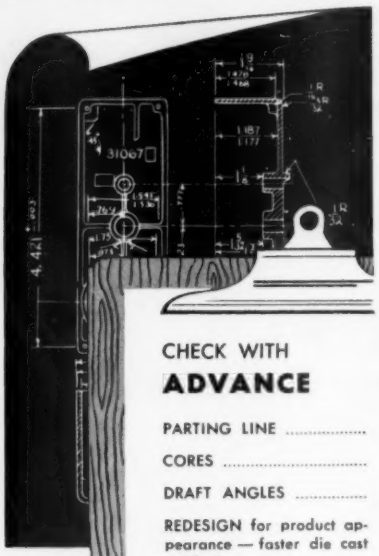
FOR DIE CAST COMPONENTS

Let's start with your *Preliminary* print



CHECK WITH **ADVANCE**

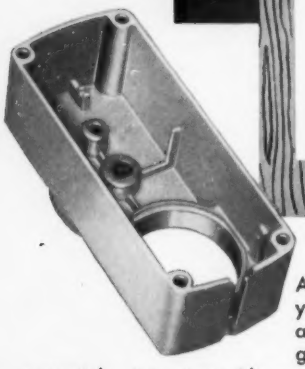
PARTING LINE .....

CORES .....

DRAFT ANGLES .....

REDESIGN for product appearance — faster die cast production .....

DIMENSION CONTROL POINTS .....



A good way to improve your product's appearance — lower its cost — give impetus to its sales potential — is to start with your preliminary drawings.

Particularly with zinc and aluminum die cast components, early planning solves many a design and production problem with happy advantages both to manufacturing economy and market appeal.

Yes . . . for new product design . . . or redesign of existing products to improve market position . . . check your die cast component parts with ADVANCE . . . *starting with early preliminary drawings.*

These symbols are your assurance of highest quality zinc and aluminum alloys under ASTM standards.

DIE CASTING RESEARCH FOUNDATION PARTICIPANT

ADVANCE TOOL AND DIE CASTING CO.

3782 N. Holton St.
Milwaukee 12, Wis.

Serving industry since 1920

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USEFUL LITERATURE *continued*

171 **Plating Barrel** — FREDERIC B. STEVENS, INC. — Technical data on the Poly-Carb Barrel for automatic plating processing machines.

172 **Billet Grinders** — A. JOHNSON & CO., INC. — Technical brochure on Centro-Maskin i Goteborg AB billet and slab grinders.

173 **Cloth For Polishing Buffs** — DEERING, MILLIKEN & CO., INC. — Brochure on the research, tests, and controls that go into making cloths for polishing and buffing wheels.

174 **Preparing Aluminum for Anodizing** — FREDERICK GUMM CHEMICAL CO., INC. — Application data on compounds for preparing aluminum for anodizing.

175 **Titanium Machining** — TITANIUM METALS CORP. OF AMERICA — 32-page engineering manual on machining practices for titanium.

176 **Nickel Brightener** — FEDERATED METALS DIV., AMERICAN SMELTING & REFINING CO. — Technical data on Nimax BN-30, a barrel nickel brightener specially formulated to give brilliant barrel nickel deposits.

177 **Die-Spotting Compound** — WAYNE CHEMICAL PRODUCTS CO. — Technical data on Kemifilm #27, a water-soluble die spotting compound that replaces Prussian Blue.

178 **Vibratory Finishing** — ROTO-FINISH CO. — Technical data on the Vibratron precision finishing machine that differs from conventional barrel finishing.

179 **Grinding Wheels** — MACKLIN CO. — 4-page brochure on cylindrical grinding wheels. Includes data on the abrasives and bonds used.

180 **Removes Cyanide Salts** — MAGNUS CHEMICAL CO., INC. — Technical data on the Magnus 61-DRX, a new method for removing sodium cyanide salts faster, safer and cheaper.

181 **Paint Stripping** — ENTHONE, INC. — Brochure on paint strippers for every application.

182 **Sealer Nuts** — STANLEY INDUSTRIAL HARDWARE SALES — Data on Plastisol sealer nuts that seal against dirt, liquids and other undesirable materials.

183 **Surface Treating Equipment** — RANSOHOFF CO. — 40-page catalog on machinery and systems for metal surface processing.

184 **Metal Cleaning** — OAKITE PRODUCTS, INC. — 28-page engineering handbook on all phases of metal cleaning.

185 **Polishing Compositions** — F. B. STEVENS, INC. — Technical data on 11 special liquid compositions for buffing and coloring operations.

186 **Boring, Facing, Threading Tools** — COMET TOOL CO. — 6-page brochure on a complete line of precision boring, facing, and internal threading tools.
Retaining Rings — RAMSEY CORP. — 40-page retaining Ring Engineering Specification Manual can be obtained by writing on your letterhead to 3693 Forest Park Blvd., St. Louis, Mo.

187 **Contact Wheels** — CHICAGO RUBBER CO., INC. — Technical data on the selection and application of contact wheels and industrial rolls.

189 **Descaling Machines** — PANGBORN CORP. — 20-page technical bulletin on a complete line of Rotoblast descaling machines.

190 Chemical Milling — CHEMICAL MILLING INTERNATIONAL CORP. — Brochure describes the company's services of research, consultation, and production of chemically-milled parts.

191 Cleaner — MAC DERMID INC. — Technical Data Sheet 77 describes an acid base liquid for removing oxide and tarnish from copper, copper alloys and silver.

192 Barrel Finishing Compound — ESBEC BARREL FINISHING CORP. — Technical data on ESBEC 680, a new dual purpose abrasive compound.

193 Plating, Anodizing — HANSON-VAN WINKLE-MUNNING CO. — Technical bulletins illustrate the company's new plating and anodizing lines.

194 Stripper — ENTHONE, INC. — Technical data on a cold, chlorinated, dilutable liquid stripper for epoxy enamels.

195 Rust Retardant — MAC DERMID INC. — Technical Data Sheet 93 describes a rust retardant suitable for either temporary or more lasting protection of ferrous metals.

196 Aluminum Etching — OAKITE PRODUCTS, INC. — Technical data sheet on Composition No. 160, an etching material that does away with hardened sludge, fumes and foam.

197 Cleaning — OAKITE PRODUCTS, INC. — 26-page research report on the evolution of cleaning through technology.

198 Paint Primer — COSDEN PAINT CO. — Technical report on Allprime, a universal primer for use on aluminum, brass, copper, cadmium, monel, nickel.

COLUMBIA
TOOL STEELS

For over fifty years COLUMBIA has built its reputation on tool steel that is *good* for you

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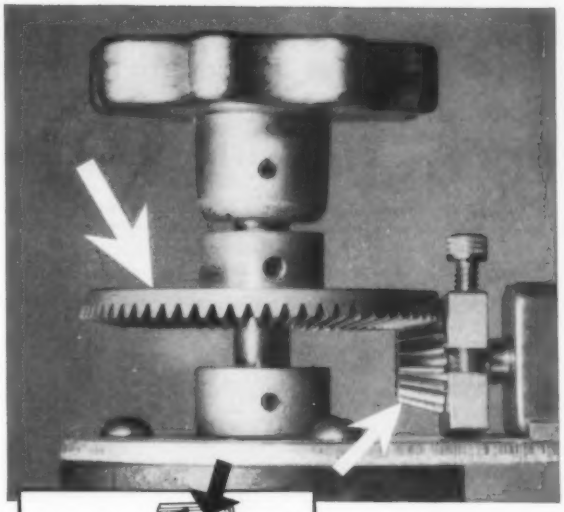
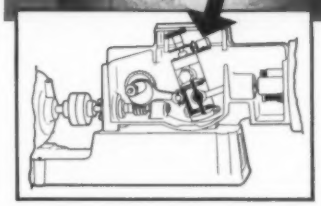
ADVANTAGES SUCH AS THESE with ***METAL POWDERS***





reduced gear costs 80% for the Lapp Pulsafeeder

These mating bevel gears were formerly cut from bronze sand castings, resulting in high costs due to expensive machining, high scrap loss, and frequent rejection.

Switching to **BRASS POWDER METALLURGY,** the Lapp Insulator Company, Inc., now buys these gears from a custom fabricator* — **NO MACHINING — NO SCRAP LOSS — A MINIMUM OF INSPECTION.**

These BRASS POWDER gears now cost 80% less for the large and 65% less for the small one over the former method of production.

**Engineered Plastics, Inc., Watertown, Conn.*

THIS BOOKLET
will assist you in evaluating this modern production method in terms of your particular needs.

SEND FOR YOUR COPY

THE NEW JERSEY ZINC COMPANY
160 Front Street, New York 38, N. Y.

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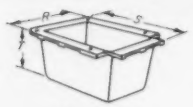
MILLES

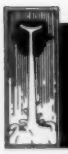
KETTLES

For every Die Casting Machine

All kettles shown are carried in stock for immediate delivery.

	KETTLE NO.	SIZE IN INCHES R	S	T	FOR USE IN
 M-2 M-3	M-1	16½	20¾	12¼	Kux Mach K-5
	M-2	22⅛	32⅞	15½	Kux C S-144 B H-30 B A-12 B H-18
	M-3	22	50½	15½	Kux B H-40
	M-4	28½	37¼	19	Kux B H-37
	400-C	24	35½	18	Cleveland C-400
	R-P-L	30	42⅞	16¼	Reed-Prentice No. 2
	R-P-S	19½	44¼	19¼	Reed-Prentice No. 1½
	R-P-R	16	27	18	Reed-Prentice No. 1½
	M-C-M	19¼	39¼	20¾	Cast-Master
	M-B-T	23½	39½	18¼	B & T
	No. 46	21	16	10¼	Johnson Type
	No. 49	16	12½	8¼	Gas
	No. 58	21	16	12	Furnaces
	48" & 54" Kirksite Pots				Kirksite Melting Pots for 48" & 54" Tilting Furnaces

For immediate delivery phone: LAfayette 3-7255



MILLES EQUIPMENT & SUPPLY Co.

FOR THE FINEST IN MELTING EQUIPMENT

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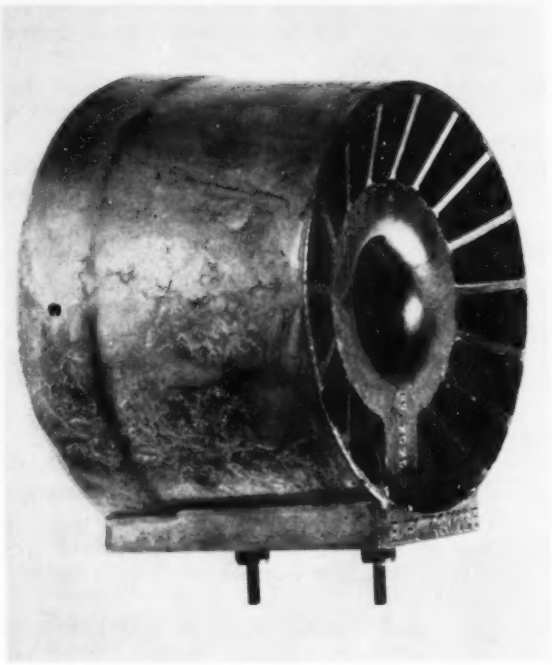
DESIGN FOR
DIE CASTINGS



Cast Heating Elements Big Hit at Drive-Ins

DIE CAST heating elements will help boost attendance at drive-in theaters this coming winter. These elements are used in an electrical heating device for warming the cars of drive-in patrons, so theaters can stay open all year instead of only in mild weather.

The elements — made by Ainsworth-Precision Castings Co. — are die cast in aluminum alloy. The alloy's heat conductivity and the smooth, thin-finned design of the element distribute enough heat to warm a car even in severe weather. Furthermore, the element is safe because there are no exposed hot wires or coils.

Two chains of drive-in theaters in the East installed these heaters in seven theaters, which remained open during the winter. The heaters are as simple to use as drive-in loudspeakers, and work so well that people kept taking them home until an extra-strong cable was inserted in the electrical wire.

***Experience**—the added alloy in **Allegheny Ludlum** tool steels*

Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

Uniform, finely-distributed sulfides mean uniform machining, uniform high finish, uniform long tool life order after order

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform *machining;* uniform *high finish;* uniform *long tool life.*

For example, in the production of hobs these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Building, Pittsburgh 22, Pa. Address Dept. PM-22

WSW-7259

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages

every grade of tool steel... every help in using it

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NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

ADCI HOLDS ANNUAL MEETING, ELECTS OFFICERS

At the 1959 annual meeting of the AMERICAN DIE CASTING INSTITUTE last month in Chicago, die casters held the unanimous opinion that the full 1959 year will see a return to the steadily-increasing use of die castings interrupted temporarily by the 1957-58 business recession.

Gordon C. Curry, vice president, Dollin Corp., was elected president of the Institute for the 1960 term. Walter E. Brown, executive vice president, Kiowa Corp., was elected vice president. David Laine and W. J. Parker, ADCI, were re-elected secretary and treasurer, respectively.

CURRY

BROWN

Each of the four regional groups elected a director to the National Board: Harry J. Marcks, vice president, C. M. Grey Industries, Inc., Eastern Regional Group; H. H. Weiss, president, The Superior Die Casting Co., Central Regional Group; F. C. Bennett, The Dow Metal Products Co., Div. of The Dow Chemical Co., Midwestern Regional Group; Paul T. Harlow, president, Rangers Die Casting Co., Pacific Coast Regional Group. Directors-at-large are: F. W. Burgie, manager of sales, Doehler-Jarvis Div., National Lead Co.; R. R. Dreibus, president, Harvill Corp.; Alfred Schneier, vice president, Advance Pressure Castings, Inc.; L. G. Vanderhoof, vice president and general manager, Stewart Die Casting Div., Stewart-Warner Corp.

Chairmen of the regional groups are: W. F. Feil, Aluminum Co. of America, Eastern Regional Group; Norman Dress, Ainsworth-Precision Castings Co., Div. of Harsco Corp., Central Regional Group; F. C. Bennett, The Dow Metal Products Co., Div. of The Dow Chemical Co., Midwestern Regional Group; E. M. Woods, Aluminum Die Casting Co., Pacific Coast Regional Group.

During the meetings, Institute and industry accomplishments were reviewed and plans were made to further expand such basic ADCI programs as the "Product Standards for Die Castings" which enables product engineers and buyers to design and purchase die castings at the most economic levels, and the "Certified Zinc Alloy Plan" under which buyers are assured of obtaining zinc die castings with maximum physical properties. At special open panel sessions, members discussed new marketing techniques and learned of new methods of metal transfer in their plants. Principal speaker on the latter subject was Victor D. Sweeney, Metal Pumping Services, Inc.

DR. HUNTER RECEIVES ADCI DOEHLER AWARD

DR. HUNTER

The ANNUAL DOEHLER AWARD, highest honor of the die casting industry, was presented to Dr. Matthew A. Hunter, Dean Emeritus of Rensselaer Polytechnic Institute, at a banquet held in conjunction with the ADCI's annual meetings.

The award (a certificate, plaque, and cash honorarium) was presented to Dr. Hunter by Walter M. Goldhamer, vice president, The Superior Die Casting Co., on behalf of the ADCI board of directors. In making the presentation, Goldhamer reviewed the outstanding service of Dr. Hunter in his capacity as technical consultant to the Die Casting Research Foundation since its inception eight years ago.

He pointed out that the noteworthy progress in fundamental research by the Foundation in searching for improved die materials has been accomplished largely through the guidance provided by Dr. Hunter. As one of the leading authorities in the field of high temperature metallurgy, Dr. Hunter has guided the activities of the DCRF in seeking to advance the application of die casting techniques to higher melting point alloys.

METAL SHOW TO PREVIEW FABRICATION OF '60s

"Materials and Fabrication Preview of the Soaring '60s" is the theme of the AMERICAN SOCIETY FOR METALS' 41st National Metal Exposition and Congress to be held in Chicago November 2-6. The Exposition will be held in the International Amphitheatre, while Congress sessions will be held in several Chicago hotels.

ASM president Clarence H. Lorig says, "Basic metals producers, fabricators of metals who turn these metals into the components of modern living, and the scientists and engineers who push forward the frontiers of metalworking and translate discoveries and ideas into reality – all will play important roles in this significant gathering."

Nearly 400 exhibits will occupy 300,000 square feet of space, and many exhibits will be displayed in special industry sections. For example, one section will be devoted to producers and fabricators in the powder metallurgy field, including both members of the Metal Powder Industries Federation and the Federation itself. There will be an American Gas Association area, in

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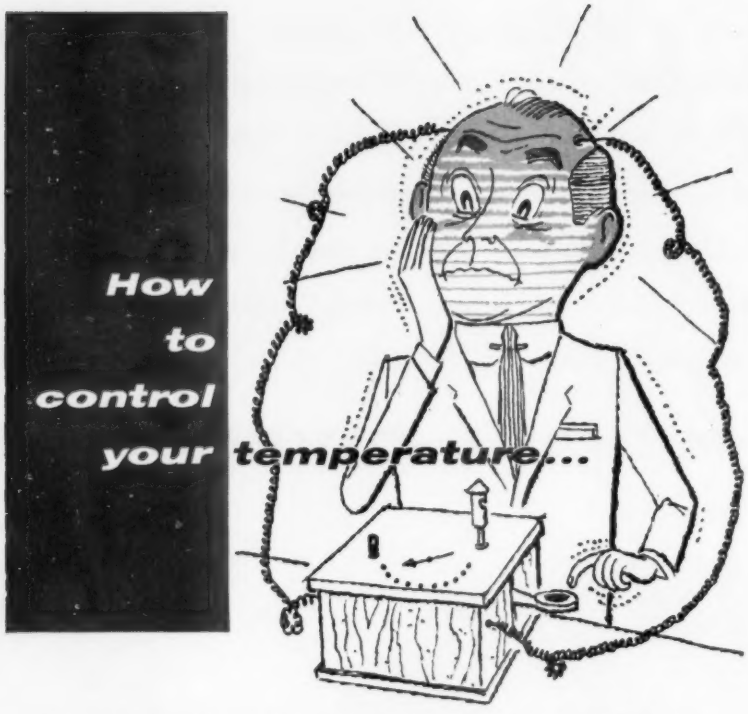
Your source for quality controlled aluminum die-casting metals. Federated aluminum ingot production is under rigid controls developed by Asarco's Central Research Laboratory. Federated Sales Engineers back up every shipment with on-the-spot assistance based on long detailed experience. For a complete choice of both aluminum and zinc die-casting alloys, call any one of the 11 plants and 23 sales offices of Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF

ASARCO

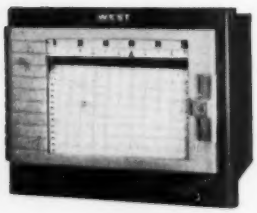
AMERICAN SMELTING AND REFINING COMPANY



Your personal temperature may soar when you see the advantages that others gain by improving control of temperature in operations like yours. But you can confidently control both types of temperature by using our consulting service and, if necessary, some of our instruments.

For we are specialists in temperature control. Our worldwide field force is constantly working with situations like yours, seeking waste and hidden potentials where "control is no problem." Working with your own people, chances are they'll find ways to boost your production...assure quality... reduce costs.

We provide such service without charge, to determine whether you really need our indicators or controllers or recorders, thermocouples and accessories. Chances are that you do; for our instruments soon save their cost in avoiding work-stoppage and reducing maintenance.



Marksman Recorders

Model M (shown) potentiometer strip-chart recorder delivers outstanding service and economy through features rarely available in a single instrument. Veri-Tell indicators and Gardsman controllers serve as well. All are tubeless, "solid-state" and proved in wide use. Phone your West consultant (see Yellow pages) or write Chicago office for Bulletin M or for COM digest-catalog of line.

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the trend is to **WEST**
Represented in Canada by Davis Automatic Controls, Ltd.

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which industrial heating equipment will be grouped. And, an instrumentation area is planned for sensitive precision equipment, with minimized noise, vibration, and dust.

At the Metal Congress, more than 275 technical presentations will be made in symposiums, panel discussions, seminars, and formal sessions of the ASM and these seven cooperating groups: American Institute of Mining, Metallurgical, and Petroleum Engineers (Institute of Metals Division, Iron and Steel Division, Extractive Metallurgy Division); Society for Nondestructive Testing; Special Libraries Association; American Society for Testing Materials; Metal Powder Industries Federation; Metal Treating Institute; Ultrasonic Manufacturers Association.

Amphitheatre hours for the Metal Show will be: Monday, 10 a.m. to 6 p.m.; Tuesday and Wednesday, Noon to 10 p.m.; Thursday and Friday, 10 a.m. to 6 p.m.

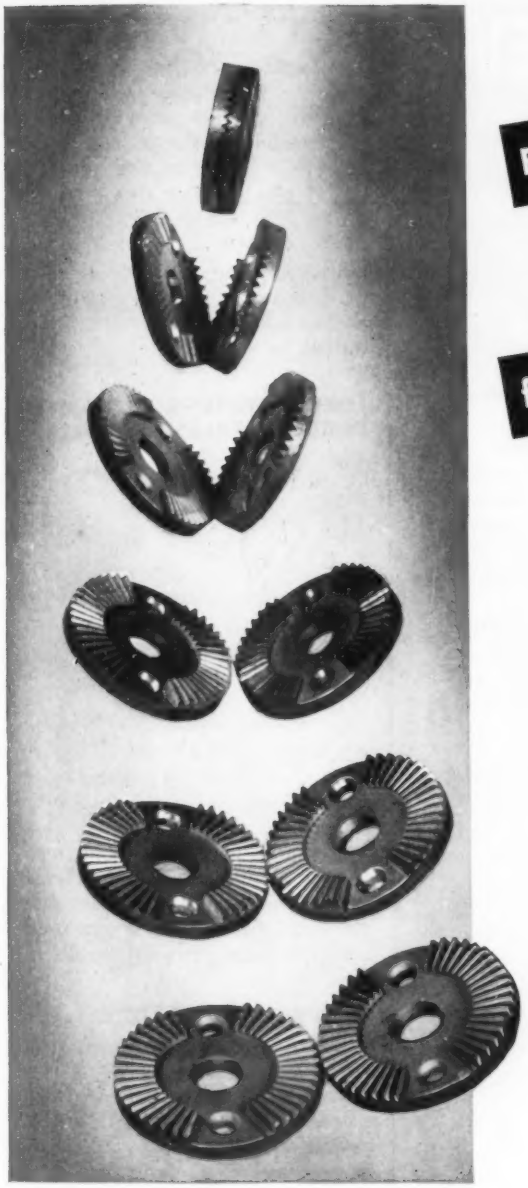
BABCOCK & WILCOX CREATES SALES POST

The new position of manager of alloy sales for THE BABCOCK & WILCOX CO.'S TUBULAR PRODUCTS DIV. has been filled by F. H. Foglesong. He'll headquarter at the division's general offices in Beaver Falls, Pa. Succeeding Foglesong as manager of the Detroit district sales office is A. D. Zar, formerly a sales representative in the Milwaukee district office.

LEAD-ZINC SMELTERS OPPOSE IMPORT QUOTAS

Six major lead and zinc smelting companies have joined in strong opposition to the present U. S. Government quotas on imports of lead and zinc. They have recommended that quotas be rescinded and replaced by increases in the appropriate customs duties.

The companies, which have presented a joint statement before the U. S. Dept. of Commerce, represent approximately 50 percent of the domestic lead and zinc smelting and refining capacity. They are: AMERICAN SMELTING AND REFINING CO.; AMERICAN ZINC, LEAD AND SMELTING CO.; ATHLETIC MINING



Sunburst dials produced by one of the Nation's leading powder metallurgy metal parts producers, the ARROW SINTERED PRODUCTS CO., Chicago, Ill.

Eliminating former production problems, this part was "made to order" for powder metallurgy production

The Orthopedic Equipment Co., Bourbon, Ind., was producing this sunburst dial on a punch press, using aluminum strip stock. They were having troubles. The limited displacement of the material caused the serrations to be uneven. Parts were either scrapped or reworked. Both operations were costly. The base material being soft . . . the part provided a limited amount of wear.

Arrow Sintered Products Co., Chicago, Ill., were brought into the production picture. Mr. L. Korenchan, General Manager, put it this way, "I knew the part was "made to order" for powder metallurgy process. *I also knew that in using Ancor MH-100 I could provide a part that would have:*

1. *Better dimensional control.*
2. *Improved mating action (serrations).*
3. *Increased strength.*
4. *Lower unit cost.*

These production improvements were obtained because the Hoeganaes Ancor MH-100 powder provided uniform density, compressability and particle distribution.

Having trouble with your parts production? Contact your nearby metal parts fabricator or the Hoeganaes Engineering Specialist. It may be that *Hoeganaes powders are the answer to your problems, too.*

HSIC

HOEGANAES

HOEGANAES SPONGE IRON CORPORATION

RIVERTON, NEW JERSEY

SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Los Angeles, Minneapolis, New England (Elmira, N.Y.), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

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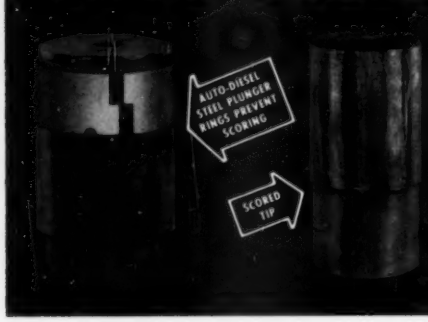
Circle No. 8 on Reader Service Card

AUTO-DIESEL'S NEW TIP & RING PLUNGER COMBINATION



6 MONEY SAVING ADVANTAGES

1. Longer wear
2. Denser castings
3. Eliminates aluminum pick-up on sleeves
4. Reduces tip changing down-time
5. Eliminates buying or making new tips
6. You can salvage and use your old tips

Greater Efficiency

Solves problem of scored or worn tips—saving thousands of dollars per year for the die casting industry.

Beryllium copper and steel plunger rings on piston tips result in maximum service life.

Catalog on Request

Plus—Auto-Diesel now offers stainless steel liners for goosenecks—increasing present life 4 to 1—literature on request.

1921 AUTO-DIESEL AD CLEVELAND 1959

THE AUTO-DIESEL PISTON RING CO.
3141 Superior Avenue • Cleveland 14, Ohio

For *BETTER* POWDERED METAL PARTS
Specify **MERRIMAN**
QUALITY • PERFECTION
UNFAILING PERFORMANCE

Originators of sintered helical gears. Master craftsmen in producing highest quality, dimensionally perfect parts from powdered metal in Brass, Bronze, Copper, Nickle Silver, Steel, Iron, Iron Alloys — Copper Infiltration.

WRITE FOR CATALOG AND TECHNICAL BULLETIN.

POWDERED METAL DIVISION
MERRIMAN BROS., INC.
ORIGINATORS OF SINTERED HELICAL GEARS
185 Amory Street Boston 30, Mass.
REPRESENTATIVES IN PRINCIPAL CITIES
183 So. Chatsworth — 301 St. Paul, Minn. | 793 Laureiton Rd. Rochester 9, N.Y. | 26018 West Seven Mile Rd. Detroit 19, Mich.

Circle No. 41 on Reader Service Card

AND SMELTING CO.; BLACKWELL ZINC CO., INC.; MATTHIESSEN AND HEGELER ZINC CO.; NATIONAL ZINC CO., INC.

According to the six companies, the effect of the import quotas in the 11 months since they were imposed has been to "cause major dislocation of lead and zinc raw material supplies" and "financial hardships and metallurgical difficulties to the domestic smelting industry."

LOEWY-HYDROPRESS NAMES PRODUCT SALES MANAGERS

GOVAN

SANDERS

LOEWY-HYDROPRESS DIV., BALDWIN-LIMA-HAMILTON CORP., has appointed two product sales managers: William L. Govan, chief project engineer, assumes additional functions as product sales manager, hydraulic machinery; Gerald L. Sanders, formerly assistant sales manager, rolling mills, is now product sales manager, rolling mills.

OLIN'S FINNEGAN DIES

Edward J. Finnegan, traffic manager of the METALS DIV., OLIN MATHIESON CHEMICAL CORP., died recently. He joined the firm in 1949 as traffic analyst, and was named traffic manager in January.

GILLSON TO HEAD AIME

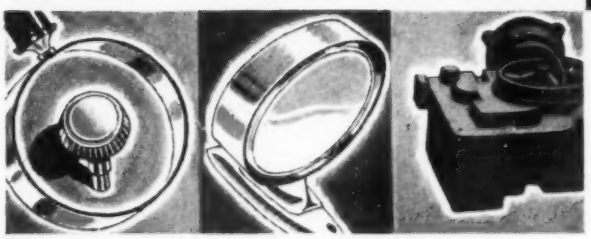
Dr. Joseph L. Gillson, chief geologist at E. I. du Pont de Nemours & Co., has been elected 1960 president of the AMERICAN INSTITUTE OF MINING, METALLURGICAL, AND PETROLEUM ENGINEERS. Dr. Gillson and other new officers will take office during the Institute's annual meeting in New York, February 14-18.

Elected vice presidents were: Dr. John Chipman, head of M.I.T.'s Dept. of Metallurgy; Stanley D. Michaelson, chief engineer, Western Mining Div., Kennecott Copper Corp.; Jerome W. Woomer,

BIG

Automobile grilles

small simple complex



Watch stem winders Mirror frames Carburetors

whatever the die-casting job

specify TADANAC zinc

From the elaborate and massive grille of a modern car to the diminutive winder of a lady's watch, more and more die-castings are being made from that versatile metal — zinc. For the very best in die-casting zincs, specify TADANAC BRAND — or alloys made from it.

For information and assistance regarding zinc die-casting, contact our Technical Service Staff. Your inquiries will be given immediate attention.

With TADANAC BRAND Zinc you get electrolytically refined zinc of consistent high quality, low in impurities and always in good supply with prompt delivery assured.

THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED

COMINCO

Metal Sales Division: 215 St. James Street W., Montreal 1, Quebec, Canada

Sold in United States by: AMERICAN METAL CLIMAX, INC., New York, Chicago, Detroit, Los Angeles

TADANAC ZINC SHAPES THE THINGS TO COME

9110

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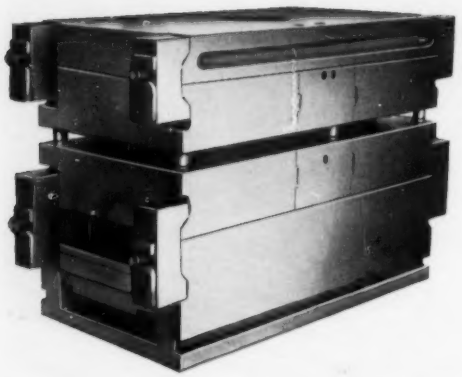
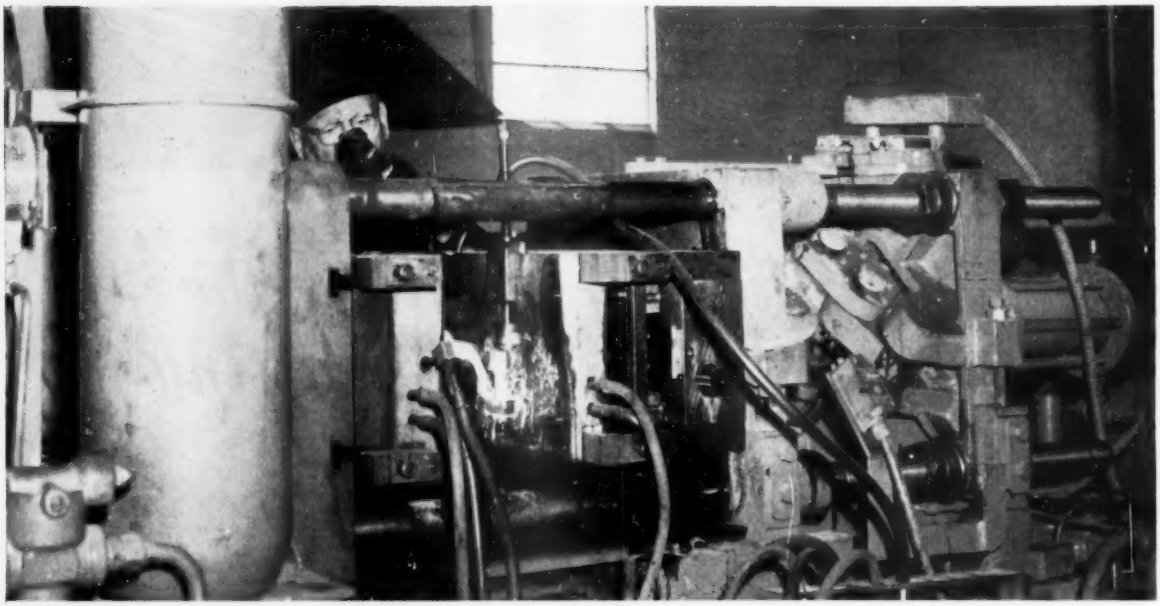


SAVE ON SHORT RUN DIE CASTINGS!

CHANGE DIES IN MINUTES!

With D-M-E Standard Unit Dies for Zinc or Aluminum Die Casting



Cut Die Costs and Save Time with Stock Replacement Units

DIE CHANGES that normally take 3 to 5 hours are done in minutes with D-M-E's Standard Unit Dies for zinc or aluminum die casting.

Standard interchangeable Replacement Units are *in stock* now to reduce your die costs and shorten delivery schedules.

D-M-E's Standard Unit Die assembly offers these unique features for added savings in production time and maintenance:

Construction permits complete freedom on *three sides* of the cavity for placement of cores or cooling lines; six sturdy leader pins and bushings provide accurate alignment and trouble-free performance; and "quick change" wedge clamps for positive positioning of each plate.

Standard Replacement Units are quickly positioned in the Unit Die Holder by a precision T-slot in the mating edge of the plates; there is no interference with the cavity layout.

Whether you require rack and pinion or automatic "bumper-type" ejection, D-M-E has a Standard Unit Die to fit the machine.

D-M-E Unit Die Holders are available for Standard 10" x 12" or 12" x 15" Replacement Units.

Start saving *now* on your short-run die-casting jobs with D-M-E Standard Unit Dies.

SEVEN BRANCHES FOR FASTER SERVICE

Write **TODAY** for Complete Specifications

DETROIT MOLD ENGINEERING COMPANY

DME

- DETROIT: 6686 E. McNichols Rd.—CHICAGO: 5901 W. Division St. HILLSIDE, N.J.: 1217 Central Ave.—LOS ANGELES: 3700 S. Main St.
- D-M-E CORP., CLEVELAND: 502 Brookpark Rd.—DAYTON: 558 Leo St.
- D-M-E of CANADA, Inc., TORONTO, ONT.: 156 Norseman Ave.

Circle No. 20 on Reader Service Card

J. W. Woomer & Associates; Basil P. Kantzer, vice president, Union Oil Co. of California; John P. Hammond, assistant general superintendent, Production Dept., Amerada Petroleum Corp.; Dr. Walter R. Hibbard, Jr., manager of alloy studies research, General Electric Research Laboratory.

KOENIG APPOINTED VP AT LINDBERG ENGINEERING

LINDBERG ENGINEERING CO. has appointed Leon C. Koenig vice president of manufacturing. Koenig, a company founder, had been assistant secretary and plant manager.

NRC GETS NAVY CONTRACT TO STUDY METAL POWDERS

NATIONAL RESEARCH CORP. has been awarded a $100,000 contract by the U. S. Navy Bureau of Ordnance to prepare and determine the properties of ultra-fine aluminum in connection with the missile program.

Last January, National Research announced a new method for producing ultra-fine metal powders with particles one-millionth of an inch in diameter. Recent developments indicate potential applications in the powder metallurgy, electronic, catalytic chemical process, and other industries.

High-purity metals which have been produced in this size range are aluminum, iron, nickel, copper, and silver. Other powders which can be produced include gold, cobalt, manganese, lead, zinc, and the alkaline earths.

Where powder metallurgy is concerned, these super-fine powders may open up short cuts to new, exact composition alloys with superior physical properties.

PRECISION EXTRUSIONS OPENS NEW OFFICE

An engineering, sales, and service office to serve Indiana has been established by PRECISION EXTRUSIONS, INC. The office, located at 6216 Carrollton Ave., Indianapolis, will be headed by Harry C. Barrett.

3rd in a series of POWDERED METAL PARTS applications by REESE

COST AND SERVICE STORY

behind Reese Powdered Metal Knobs for Bernz-O-Matic Ceramic Grill

From John B. Spiggle, Purch. Agent for the Otto Bernz Co., Inc.: "Our present brass powdered metal knob was evolved from a smaller knob that was re-designed from a screw machine part to reduce cost. When we required a larger but similar knob on another product, we immediately thought of powdered metal. Reese received the order for this new part because their price and delivery were better than others who had quoted. We have continued to do business with Reese because their prices have been in line and their service and quality better than our other sources for powdered metal parts."

FREE BROCHURE "How to Cut Precision Parts Cost with the Remet Powdered Metal Process" shows how the Reese Corp. can help you. Send for your copy today.

Remet

REESE METAL PRODUCTS CORPORATION

537 Howard Ave., Lancaster 10, Penna.

Gears • Pinions • Cams • Ratchets
Oilless Bearings • Bushings • Machine and Structural Parts in
COPPER • BRASS • IRON • ALLOY STEEL • NICKEL SILVER • COPPER INFILTRATED IRON

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POUR EASIER, POUR FASTER, MORE POURS PER LADLE

***with* SPINCRAFT LADLES**

Light, rugged, Spincraft ladles save replacement costs, make every pouring job easier! Available in a vast range of sizes, in stainless steel as well as mild.

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LIGHT IN WEIGHT LESS FATIGUE!
•
NON-SPILL SHAPE NO WASTE!
•
EQUIPOISED HANDLE BALANCED!

Write Today for Complete Data and Prices.

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MARVEL
SYNCLINAL FILTERS

FOR DEPENDABLE PROTECTION on all Hydraulic and other low pressure circulating systems

Designed to give more ACTIVE filtering area—MORE dependable protection—MORE productive operation before cleaning is necessary. *Meet J.I.C. Standards.*

Synclinal SUMP TYPE

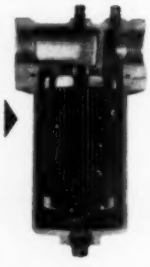
CAPACITIES: 5—8—10—20—30—50—75 and 100 G.P.M.
PIPE SIZES: ¾"—1"—1¼"—1½"—2"—2½" and 3".
CONNECTIONS: Coupling—Male Nipple.
BY-PASS VALVE: Not Available.

Synclinal LINE TYPE

CAPACITIES: 5—8—10—20—30—50—75 and 100 G.P.M.
PIPE SIZES: ¾"—1"—1¼"—1½"—2"—2½" and 3".
BY-PASS VALVE: Not available.
OPERATING PRESSURES: Up to 80 p.s.i.

Bonded SUMP TYPE

CAPACITIES: 10—20—30—50 and 75 G.P.M.
PIPE SIZES: 1"—1¼"—1½"—2"—and 2½".
CONNECTIONS: Coupling—"O" Ring—Male Nipple.
BY-PASS VALVE: Available with or without

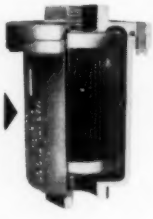


Bonded LINE TYPE

CAPACITIES: 10—20—30—50 and 75 G.P.M.
PIPE SIZES: 1"—1¼"—1½"—2" and 2½".
BY-PASS VALVE: Available with or without.
OPERATING PRESSURE: Up to 250 p.s.i.
OPERATING TEMPERATURES up to 300° F.

Tandem SUMP TYPE

CAPACITIES: 10—16—20—40—60—100—150 and 200 G.P.M.
PIPE SIZES: ¾"—1"—1¼"—1½"—2"—2½" and 3".
CONNECTIONS: Coupling—Male Nipple.
BY-PASS VALVE: Not available.



IN-LINE FILTER

CAPACITIES: Up to 60 G.P.M.
PIPE SIZES: ¾"—1"—1¼" and 1½" (at both inlet and outlet).
BY-PASS VALVE: Available with or without

FILTERING MEDIA in all Marvel Filters is Monel wire cloth available in mesh sizes of 30-40-50-60-80-100-150 and 200 to meet your filtration requirement.
EASY TO CLEAN—All Marvel Filters are easy to clean. Line type units operate in any position and may be serviced without disturbing pipe connections.
OVER 900 O. E. M's. install Marvel Filters as Standard Equipment.

IMMEDIATE DELIVERY

For further information on a specific type filter—Write—wire or phone

MARVEL ENGINEERING COMPANY
7227 N. Hamlin Ave., Chicago 45, Ill.
Phone: JUniper 8-6023

Please send me information on Marvel Filters as indicated: PMM-10

☐ Hydraulic Oils ☐ Coolants ☐ Lubricants ☐ Fire Resistant Fluids
☐ Water ☐ Sump Type ☐ Line Type ☐ In-Line

Name_____
Company_____
Address_____
City_____ State_____

LETTERS

continued from page 8

of the articles published in your magazine available?—J.J.B., metallurgist.

The names of contract die casters known to have vacuum casting facilities have been furnished. This request emphasizes the importance to the custom die caster of keeping us informed about their facilities. It is especially important that the information requested for the annual die casting directory be furnished to us, completely and promptly. We can't refer potential customers to you unless we know what work you can do.—ed.

DIE CASTING MACHINES

The writer of this letter, in company with a director of this company, will be visiting your country during October-November. One of the purposes of our visit is to investigate the latest pressure die casting machinery available and to select equipment most suitable for our needs.

Our visit will commence possibly on the 26th, October at Chicago. We intend spending approximately 10 days in the mid-west and then move on to New York for a further 10 days.

We have selected many names of equipment manufacturers from the advertisers in your magazine, but as you can appreciate we do not know the extent of the activities of these people or if they make equipment which will fill our needs. We therefore ask if you could introduce us to manufacturers of pressure die casting equipment of 10 lb. shot capacity.—W.R.S., mgr.—Australia

Names of companies who can furnish this type of equipment have been sent. We have also sent copies of this letter to each manufacturer whose name was given to this reader.—ed.

ROBERTSON JOINS HARPER

James R. Robertson, who has joined the sales staff of HARPER ELECTRIC FURNACE CORP., will direct the expansion of Harper activities in marketing gas-fired heat treating and nonferrous melting furnaces. Robertson formerly was president and general manager of WAYNE INDUSTRIAL FURNACE CO. .

PRODUCT STANDARDS FOR DIE CASTINGS

ADCI-E16-59T
LETTERING AND ORNAMENTATION

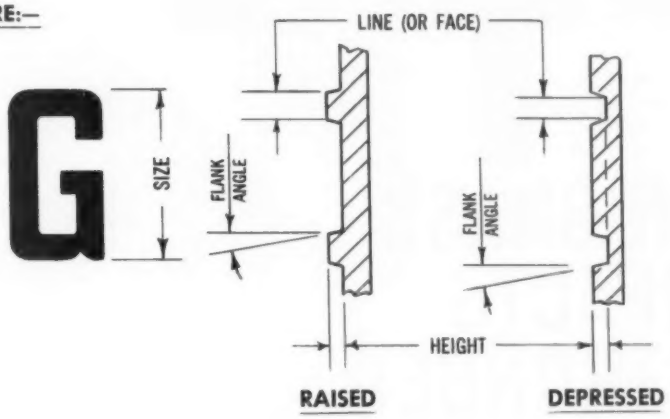
NOTE—The values shown herein represent normal production practices at the most economic level. Fine detail may involve additional costs.

DIE CAST LETTERING & ORNAMENTATION:—

Lettering, medallions, trademarks and identification symbols may be reproduced on the surfaces of die castings.

Such ornamentation may be raised or depressed, the raised being of lesser die cost and die maintenance. Raised lettering on a depressed panel, in some cases, is an economical substitute for depressed letters.

NOMENCLATURE:—



Line shall be .010 or greater.

Height shall be equal to or less than line.

Flank Angle should be 10° or greater.

SINTER BRASS COMPACTS 20% STRONGER

with lithium stearate

Recent research indicates improved physicals for brass compacts using lithium stearate as a lubricant and nitrogen as the sintering atmosphere.

Typical results promise 20% stronger, 100% more ductile parts as well as safer, more economical sintering operations.

TRY IT NOW YOURSELF!

All you need is a special powder metallurgy grade lithium stearate (fluffy) available only from us. We'll send you complete facts and lubricant samples on letterhead request. Foote Mineral Company, 474 18 West Chelten Bldg., Phila. 44, Pa.

FOOTE MINERAL COMPANY

Circle No. 23 on Reader Service Card

PMM OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding. 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

POSITIONS OPEN

Sales Representative — by progressive New England precision die casting company producing zinc and aluminum die castings. Choice territory open for qualified sales personnel. Commission basis. Address all correspondence to Box 9259.

Plant Manager — Thoroughly experienced investment casting process and operation of plant of 100 employees. Attractive proposition for aggressive individual with proper managerial and technical qualifications. All replies held in strictest confidence. Box 10159.

Sales Engineer Powder Metallurgy. Prefer man with technical and production experience. Sales experience valuable but not necessary. Contacts are in all phases of Iron and associated metal powders and in Vacuum Metallurgy. Location: Mid-west preferably between Detroit and Chicago. P. O. Box 10359.

Well established firm seeking well qualified man capable of taking charge of Die Cast Aluminum Foundry. Must be completely familiar with die shop operations. Ability to design and supervise construction of dies, trim dies and fixtures very important. Foundry located approximately 100 miles north of Chicago. State background, qualifications and salary desired. Write Box No. 10459.

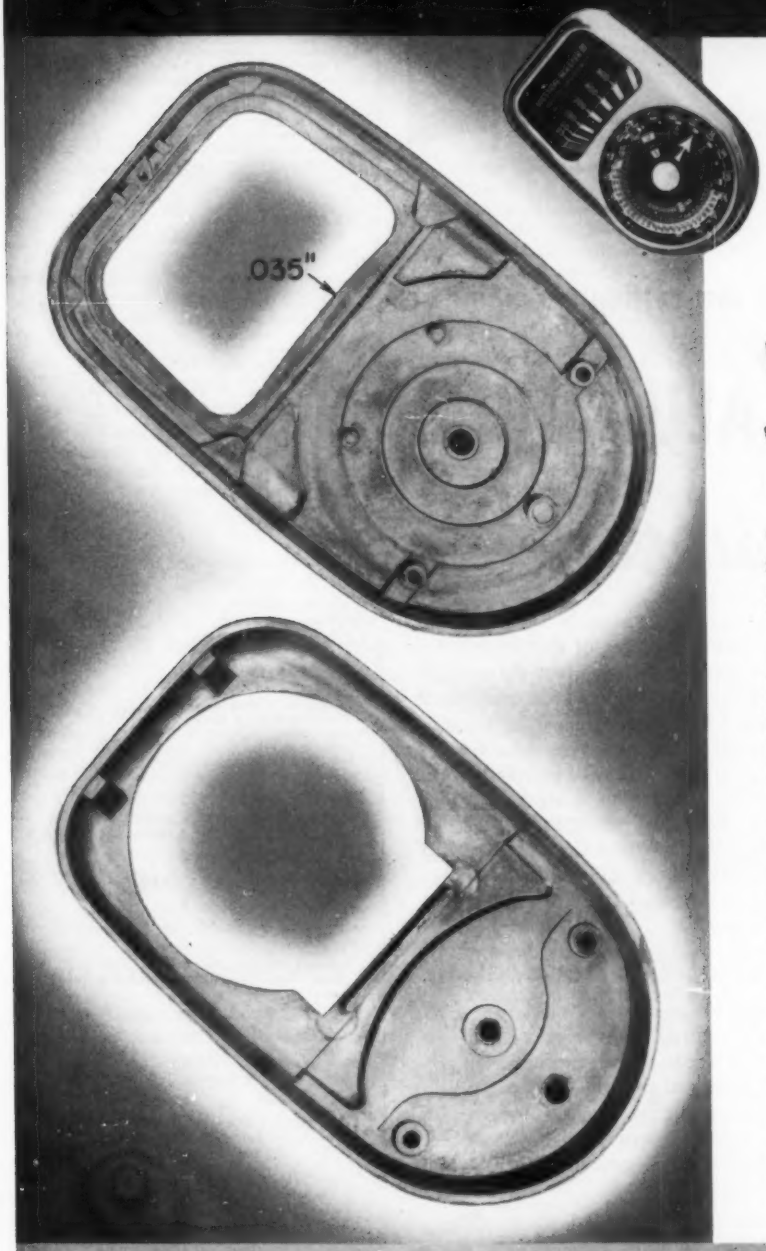
REPRESENTATIVES WANTED

Manufacturers Representatives of Metal Powder Parts wanted for St. Louis — Cleveland — Buffalo — Northern Indiana & Michigan territories. Must be established and now handling allied lines as Precision Castings, Die Castings, Screw Machine Products, Forgings, etc. — 10% commission, full co-operation. Box 10259.

R-M EXPANDS WABASH DIV.

RAYBESTOS-MANHATTAN, INC., is planning to expand its WABASH DIV. plant in Crawfordsville, Ind. The plant, which produces sintered metal products, will get a 30,000-square-foot addition.

IT'S LIGHTER THAN YOU THINK!



EXCEPTIONALLY ACCURATE... STRONG... ECONOMICAL... WHEN DIE CAST with ZAMAK

WESTON has been using these wafer-thin zinc die castings for the front and back covers of this world-famous exposure meter for 14 years.

Converting from an all-plastic case in 1945, Weston selected zinc die casting alloys for this popular precision instrument because ZAMAK offered the most in all-'round advantages. High strength combined with the lightness of a thin-wall zinc die casting were primary considerations.

Extreme accuracy of dimensions, as-cast, and the convenience of casting contours on the inside of the case for mounting to the instrument were additionally important values. Ease of assembly of the tamper-proof construction and a lasting, satin-chrome finish were extra dividends – all of these and economy, too, when die cast with ZAMAK alloys.

As in many other applications, such extremely thin wall sections – possible only with zinc die castings – minimize weight and are stronger **in proportion to thickness** than heavier sections. Such parts designed for ZAMAK alloy die casting will more than meet competition of either stampings or aluminum castings – provide many more advantages and all at lower cost.

HORSE HEAD® SPECIAL ZINC AND HORSE HEAD ZAMAK ARE PRODUCED BY

THE NEW JERSEY ZINC COMPANY

DEVELOPERS OF THE ONLY STANDARD ZINC DIE CASTING ALLOYS IN USE TODAY

160 Front Street · New York 38, N. Y.

HORSE HEAD PRODUCTS ®

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4 more cost-cutting examples of P-E ALUMINUM Extrusioneering

Here are more examples of P-E Aluminum Extrusioneering. All angles, flutes and varying thicknesses required for each piece are produced in a single operation without machining. Each design offers inherent advantages of greater strength in less weight and the plus benefits of a durable, non-corrosive finish. As indicated, the experience of P-E engineers provides invaluable aid in the functional design of extruded shapes which effect substantial savings in manufacturing costs.

ADVANTAGES OF P-E EXTRUSION MILL SERVICE

5,000 SHAPES
Mill run shapes available without die charge in a wide range of rod, bar, and tubing sizes, and numerous shapes.

NON-COMPETITIVE
We produce extrusions only, do not fabricate or manufacture any other product. You get experienced, confidential help in creating any special shape to suit your needs.

LOW DIE COST
Experienced engineering, design, and die making services save you time and money, make small or experimental runs practical.

VERSATILE EQUIPMENT
Small, medium, and large presses permit economical production. Complete integrated facilities from billet casting to finished extrusion.

SIMPLE, COMPLEX—LARGE OR SMALL

You'll find P-E is also well equipped to produce almost any type or size extrusion to serve your needs. For example, there are over 5000 standard cataloged shapes available without a die service charge, or, if necessary, special shapes can be designed and experimental runs provided at low cost to suit your specific needs.

WRITE FOR FREE CASE STUDIES — For more facts about P-E's Extrusioneering service write for case study bulletins illustrating actual solutions to design problems.

PRECISION EXTRUSIONS, INC.
725 E. GREEN AVENUE • BENSENVILLE, ILLINOIS
Phone: POrter 6-0098 • (Chicago) TUxedo 9-1701
Chicagoland's Oldest, Most Experienced Aluminum Extruder

SALES OFFICES: INDIANAPOLIS Clifford 1-8525 · MILWAUKEE WOodruff 4-8840 · GRAND RAPIDS GLendale 1-2511 · ST. PAUL Midway 6-2887 · PHILADELPHIA MArket 7-6860 · LOS ANGELES DUnkirk 1-7175

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DATA OFFERED IN THIS MONTH'S ADS

Qualified readers may obtain any of these free reference materials by circling the numbers on the Reader Service Cards

2. Tool Steels — Publication list from Allegheny Ludlum Steel Corp. describes 125 technical publications on tool steels which are available.

7. Investment Casting — "Practical Guide to Investment Casting" is a 44-page design handbook from Arwood Precision Casting Corp.

8. Plunger Rings — Literature on The Auto-Diesel Piston Ring Company's tip and ring plunger combination that solves the problem of scored or worn tips.

10. Induction Melting — Data bulletins on induction melting equipment with multiductor power. Features include: less initial cost; less operating cost; and less maintenance and material cost. Ajax Electrothermic Div., Ajax-Magnethermic Corp.

11. Die Casting Machines — Complete details on a line of high-pressure cold-chamber and hot-chamber die casting machines in capacities from 125 to 1,000 tons. B & T Machinery Company.

12. Sintering — The "Engineering Handbook of Powder Metallurgy" and Catalog No. 58, which lists 2,227 sizes of completely finished cast bronze sintered oil-filled bearings, are available from Bunting Brass & Bronze Co.

13. Refractory Shapes — If you work with aluminum holding or alloying furnaces, you should get data on refractory shapes from Refractories Div., The Carborundum Co.

15. High Temperature Alloy — Technical Bulletin No. 86 from Cannon-Muskegon Corp. gives data on Rene 41, an alloy for use in the 1200°-1800° F. range.

16. Die Casting Machines — Complete line of Cast-Master die casting machines is described in Catalog CM-100. H-P-M Div., Koehring Co.

19. Die Castings — Brochure from DiSalle Plating & Die Casting Co., presents a picture story on their facilities for making your specialized die castings.

20. Standard Unit Dies — Literature from Detroit Mold Engineering Co. tells how to make die changes in minutes when die casting zinc or aluminum.

22. Die Castings — A 16-page facilities folder from the Dollin Corp. gives their die-casting techniques for solving rigid design requirements in zinc and aluminum castings.

26. "Small Zinc Die Castings Exclusively" — is the title of a bulletin from Gries Reproducer Corp. The company's method for delivering parts of high uniformity, with close tolerances, is explained.

28. Heating Equipment — Complete details are available from Hevi-Duty Electric Co. on their line of industrial heating equipment.

29. Investment Casting — Brochure from Hitchiner Mfg. Co. gives technical data on how you can utilize the freedom and savings offered with investment castings.

32. Zinc Alloy Facts — "Reference Book and Guide on Zamak Die Casting Alloys." Includes production and design data. Henning Bros. & Smith, Incorporated.

36. Powder Metal Presses — A complete line of hydraulic and mechanical models in capacities from 10-tons to 500-tons. Illustrated catalog. Kux Machine Co.

38. Induction Heating Units — from Lepel High Frequency Laboratories, Inc., for brazing, melting, annealing, etc., are presented in an engineering catalog.

47. Cutting Costs — with brass powder metallurgy. Engineering data booklet evaluates this production method in terms of particular needs. The New Jersey Zinc Co.

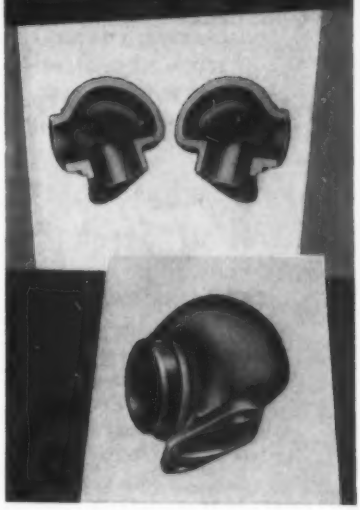
50. Cleans, Lubricates — That's what the Air-Lube System, manufactured by Pierce-Waller, Inc. does. Technical data sheets are available.

51. Extrusions — Brochure from Precision Extrusions, Inc. gives detailed cost studies on cost-cutting examples of aluminum extrusions.

52. Vacuum Die Castings — Literature on vacuum die castings and the Premier Die Casting Company's facilities for producing them.

54. Sintering Savings — A technical report, "How to Cut Costs With The Remet Powdered Metal Process" is available from Reese Metal Products Corp.

two halves *don't* make a hole!



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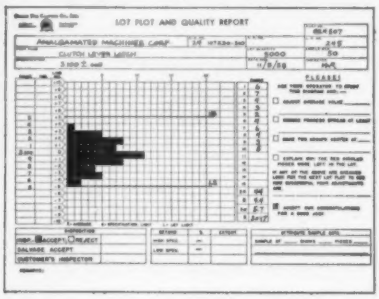

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CRITICAL DIMENSIONS
can be held within specified limits. Buyers who rely on statistical dimensioning to assure accurate parts for assembly are invited to consult Stroh.

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DATA IN ADS *continued*

55. **Iron Powder** — Technical data is available from Republic Steel Corp. on their HS6460 high strength iron powder.

56. **Ladles** — Technical data and prices are available from Spincraft, Inc. on their line of stainless steel ladles.

58. **Statistical Quality Control** — for die castings. Technical literature from Stroh Die Casting Co., Inc. describes their use of quality control for lower inspection costs.

61. **Temperature Recorders** — Bulletin M from West Instrument Corp. gives data on their line of potentiometer strip-chart recorders.

62. **Finishing Data File** — on process chemicals for the metal finishing industry. Allied Research Products, Incorporated.

63. **Barrel Finishing** — 40-page technical manual describes Carbotrol 7, a 7 step process for precision controlled barrel finishing. Electro-Minerals Div., The Carborundum Company.

42. **Kettles** — Data sheet from Milles Equipment & Supply Co. lists a complete line of kettles for every die casting machine.

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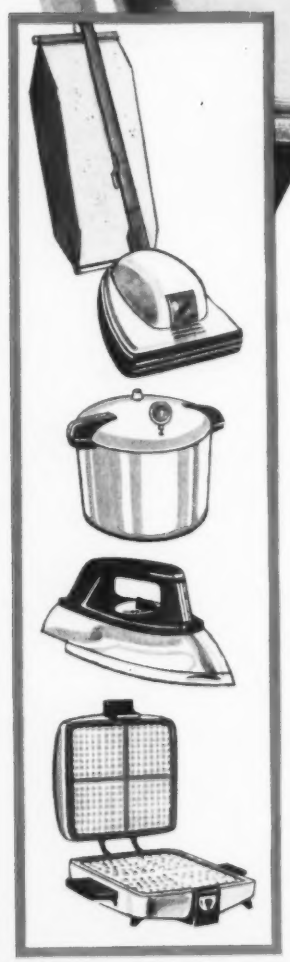

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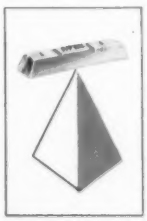

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